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for public review of data and information available, and shall solicit comments, data and information with respect to the determination on the application. Except as may otherwise be specified, the period for public comment shall be 60 days after the notice appears in the FEDERAL REGISTER.

(e) The Secretary on his own initiative may convene a hearing if, in his discretion, he considers such hearing will advance his evaluation of the application.

§ 430.54 Referral to the Attorney General.

Notice of the application for exemption under this subpart shall be transmitted to the Attorney General by the Secretary and shall contain (a) a statement of the facts and of the reasons for the exemption, and (b) copies of all documents submitted.

§ 430.55 Evaluation of application.

The Secretary shall grant an application for exemption submitted under this subpart if the Secretary finds, after obtaining the written views of the Attorney General, that a failure to allow an exemption would likely result in a lessening of competition.

§ 430.56 Decision and order.

(a) Upon consideration of the application and other relevant information received or obtained, the Secretary shall issue an order granting or denying the application.

(b) The order shall include a written statement setting forth the relevant facts and the legal basis of the order.

(c) The Secretary shall serve a copy of the order upon the applicant and upon any other person readily identifiable by the Secretary as one who is interested in or aggrieved by such order. The Secretary also shall publish in the FEDERAL REGISTER a notice of the grant or denial of the order and the reason therefor.

§ 430.57 Duration of temporary exemption.

A temporary exemption terminates according to its terms but not later than twenty-four months after the effective date of the rule for which the exemption is allowed.

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AUTHORITY: 42 U.S.C. 6291–6317.

SOURCE: 64 FR 54141, Oct. 5, 1999, unless otherwise noted.

Subpart A—General Provisions

§ 431.1 Purpose and scope.

This part establishes the regulations for the implementation of provisions relating to commercial and industrial equipment in Part B of Title III of the Energy Policy and Conservation Act (42 U.S.C. 6291–6309) and in Part C of Title III of the Energy Policy and Conservation Act (42 U.S.C. 6311–6317), which establishes an energy conservation program for certain commercial and industrial equipment.

[70 FR 60414, Oct. 18, 2005]

§ 431.2 Definitions.

The following definitions apply for purposes of this part. Any words or terms not defined in this Section or elsewhere in this part shall be defined as provided in Section 340 of the Act.

Act means the Energy Policy and Conservation Act of 1975, as amended, 42 U.S.C. 6291–6316.

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Alternate efficiency determination method or AEDM means a method of calculating the efficiency of a commercial HVAC and WH product, in terms of the descriptor used in or under section 342(a) of the Act to state the energy conservation standard for that product.

Btu means British thermal unit, which is the quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

Commercial HVAC & WH product means any small, large, or very large commercial package air-conditioning and heating equipment, packaged terminal air conditioner, packaged terminal heat pump, single package vertical air conditioner, single package vertical heat pump, computer room air conditioner, variable refrigerant flow multi-split air conditioner, variable refrigerant flow multi-split heat pump, commercial packaged boiler, hot water supply boiler, commercial warm air furnace, instantaneous water heater, storage water heater, or unfired hot water storage tank.

Covered equipment means any electric motor, as defined in § 431.12; commercial heating, ventilating, and air conditioning, and water heating product (HVAC & WH product), as defined in § 431.172; commercial refrigerator, freezer, or refrigerator-freezer, as defined in § 431.62; automatic commercial ice maker, as defined in § 431.132; commercial clothes washer, as defined in § 431.152; distribution transformer, as defined in § 431.192; illuminated exit sign, as defined in § 431.202; traffic signal module or pedestrian module, as defined in § 431.222; unit heater, as defined in § 431.242; commercial prerinse spray valve, as defined in § 431.262; mercury vapor lamp ballast, as defined in § 431.282; refrigerated bottled or canned beverage vending machine, as defined in § 431.292; walk-in cooler and walk-in freezer, as defined in § 431.302; metal halide ballast and metal halide lamp fixture, as defined in § 431.322.

DOE or the Department means the U.S. Department of Energy.

Energy conservation standard means any standards meeting the definitions of that term in 42 U.S.C. 6291(6) and 42 U.S.C. 6311(18) as well as any other water conservation standards and de-

sign requirements found in this part or parts 430 or 431.

EPCA means the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6291–6316.

Flue loss means the sum of the sensible heat and latent heat above room temperature of the flue gases leaving the appliance.

Gas means propane or natural gas as defined by the Federal Power Commission.

Import means to import into the customs territory of the United States.

Independent laboratory means a laboratory or test facility not controlled by, affiliated with, having financial ties with, or under common control with the manufacturer or distributor of the covered equipment being evaluated.

Industrial equipment means an article of equipment, regardless of whether it is in fact distributed in commerce for industrial or commercial use, of a type which:

(1) In operation consumes, or is designed to consume energy;

(2) To any significant extent, is distributed in commerce for industrial or commercial use; and

(3) Is not a “covered product” as defined in Section 321(2) of EPCA, 42 U.S.C. 6291(2), other than a component of a covered product with respect to which there is in effect a determination under Section 341(c) of EPCA, 42 U.S.C. 6312(c).

ISO means International Organization for Standardization.

Manufacture means to manufacture, produce, assemble, or import.

Manufacturer means any person who manufactures industrial equipment, including any manufacturer of a commercial packaged boiler.

Manufacturer’s model number means the identifier used by a manufacturer to uniquely identify the group of identical or essentially identical commercial equipment to which a particular unit belongs. The manufacturer’s model number typically appears on equipment nameplates, in equipment catalogs and in other product advertising literature.

Private labeler means, with respect to a commercial HVAC & WH product, an owner of a brand or trademark on the

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label of a product which bears a private label. A commercial HVAC & WH product bears a private label if:

(1) Such product (or its container) is labeled with the brand or trademark of a person other than a manufacturer of such product;

(2) The person with whose brand or trademark such product (or container) is labeled has authorized or caused such product to be so labeled; and

(3) The brand or trademark of a manufacturer of such product does not appear on such label.

Secretary means the Secretary of Energy.

State means a State, the District of Columbia, Puerto Rico, or any territory or possession of the United States.

State regulation means a law or regulation of a State or political subdivision thereof.

[69 FR 61923, Oct. 21, 2004, as amended at 71 FR 71369, Dec. 8, 2006; 74 FR 12071, Mar. 23, 2009; 75 FR 666, Jan. 5, 2010; 76 FR 12503, Mar. 7, 2011; 77 FR 28987, May 16, 2012]

Subpart B—Electric Motors

SOURCE: 69 FR 61923, Oct. 21, 2004, unless otherwise noted.

§ 431.11 Purpose and scope.

This subpart contains energy conservation requirements for electric motors. It contains test procedures that EPCA requires DOE to prescribe, related requirements, energy conservation standards prescribed by EPCA, labeling rules, and compliance procedures. It also identifies materials incorporated by reference in this part. This subpart does not cover “small electric motors,” which are addressed in subpart X of this part.

[77 FR 26633, May 4, 2012]

§ 431.12 Definitions.

The following definitions apply for purposes of this subpart, and of subparts U and V of this part. Any words or terms not defined in this Section or elsewhere in this part shall be defined as provided in Section 340 of the Act.

Accreditation means recognition by an accreditation body that a laboratory is competent to test the efficiency of electric motors according to the scope

and procedures given in Test Method B of IEEE Std 112-2004 and CSA C390-10 (incorporated by reference, see § 431.15).

Accreditation body means an organization or entity that conducts and administers an accreditation system and grants accreditation.

Accreditation system means a set of requirements to be fulfilled by a testing laboratory, as well as rules of procedure and management, that are used to accredit laboratories.

Accredited laboratory means a testing laboratory to which accreditation has been granted.

Alternative efficiency determination method or *AEDM* means, with respect to an electric motor, a method of calculating the total power loss and average full load efficiency.

Average full load efficiency means the arithmetic mean of the full load efficiencies of a population of electric motors of duplicate design, where the full load efficiency of each motor in the population is the ratio (expressed as a percentage) of the motor's useful power output to its total power input when the motor is operated at its full rated load, rated voltage, and rated frequency.

Basic model means, with respect to an electric motor, all units of a given type of electric motor (or class thereof) manufactured by a single manufacturer, and which have the same rating, have electrical characteristics that are essentially identical, and do not have any differing physical or functional characteristics which affect energy consumption or efficiency. For the purpose of this definition, “rating” means one of the 113 combinations of an electric motor's horsepower (or standard kilowatt equivalent), number of poles, and open or enclosed construction, with respect to which § 431.25 prescribes nominal full load efficiency standards.

Certificate of conformity means a document that is issued by a certification program, and that gives written assurance that an electric motor complies with the energy efficiency standard applicable to that motor, as specified in § 431.25.

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Certification program means a certification system that determines conformity by electric motors with the energy efficiency standards prescribed by and pursuant to the Act.

Certification system means a system, that has its own rules of procedure and management, for giving written assurance that a product, process, or service conforms to a specific standard or other specified requirements, and that is operated by an entity independent of both the party seeking the written assurance and the party providing the product, process or service.

CSA means Canadian Standards Association.

Definite purpose motor means any motor that cannot be used in most general purpose applications and is designed either:

(1) To standard ratings with standard operating characteristics or standard mechanical construction for use under service conditions other than usual, such as those specified in NEMA MG1–2009, paragraph 14.3, “Unusual Service Conditions,” (incorporated by reference, see § 431.15); or

(2) For use on a particular type of application.

Electric motor means a machine that converts electrical power into rotational mechanical power.

Enclosed motor means an electric motor so constructed as to prevent the free exchange of air between the inside and outside of the case but not sufficiently enclosed to be termed airtight.

Fire pump electric motor means an electric motor, including any IEC-equivalent, that meets the requirements of section 9.5 of NFPA 20 (incorporated by reference, see § 431.15).

Fire pump motors [Reserved]

General purpose electric motor means any electric motor that is designed in standard ratings with either:

(1) Standard operating characteristics and mechanical construction for use under usual service conditions, such as those specified in NEMA MG1–2009, paragraph 14.2, “Usual Service Conditions,” (incorporated by reference, see § 431.15) and without restriction to a particular application or type of application; or

(2) Standard operating characteristics or standard mechanical construc-

tion for use under unusual service conditions, such as those specified in NEMA MG1–2009, paragraph 14.3, “Unusual Service Conditions,” (incorporated by reference, see § 431.15) or for a particular type of application, and which can be used in most general purpose applications.

General purpose electric motor (subtype I) means a general purpose electric motor that:

(1) Is a single-speed, induction motor;

(2) Is rated for continuous duty (MG1) operation or for duty type S1 (IEC);

(3) Contains a squirrel-cage (MG1) or cage (IEC) rotor;

(4) Has foot-mounting that may include foot-mounting with flanges or detachable feet;

(5) Is built in accordance with NEMA T-frame dimensions or their IEC metric equivalents, including a frame size that is between two consecutive NEMA frame sizes or their IEC metric equivalents;

(6) Has performance in accordance with NEMA Design A (MG1) or B (MG1) characteristics or equivalent designs such as IEC Design N (IEC);

(7) Operates on polyphase alternating current 60-hertz sinusoidal power, and:

(i) Is rated at 230 or 460 volts (or both) including motors rated at multiple voltages that include 230 or 460 volts (or both), or

(ii) Can be operated on 230 or 460 volts (or both); and

(8) Includes, but is not limited to, explosion-proof construction.

NOTE TO DEFINITION OF GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE I): References to “MG1” above refer to NEMA Standards Publication MG1–2009 (incorporated by reference in § 431.15). References to “IEC” above refer to IEC 60034–1, 60034–12, 60050–411, and 60072–1 (incorporated by reference in § 431.15), as applicable.

General purpose electric motor (subtype II) means any general purpose electric motor that incorporates design elements of a general purpose electric motor (subtype I) but, unlike a general purpose electric motor (subtype I), is configured in one or more of the following ways:

(1) Is built in accordance with NEMA U-frame dimensions as described in NEMA MG1–1967 (incorporated by reference, see § 431.15) or in accordance

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with the IEC metric equivalents, including a frame size that is between two consecutive NEMA frame sizes or their IEC metric equivalents;

(2) Has performance in accordance with NEMA Design C characteristics as described in MG1 or an equivalent IEC design(s) such as IEC Design H;

(3) Is a close-coupled pump motor;

(4) Is a footless motor;

(5) Is a vertical solid shaft normal thrust motor (as tested in a horizontal configuration) built and designed in a manner consistent with MG1;

(6) Is an eight-pole motor (900 rpm); or

(7) Is a polyphase motor with a voltage rating of not more than 600 volts, is not rated at 230 or 460 volts (or both), and cannot be operated on 230 or 460 volts (or both).

NOTE TO DEFINITION OF GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE II): With the exception of the NEMA Motor Standards MG1-1967 (incorporated by reference in § 431.15), references to “MG1” above refer to the 2009 NEMA MG1-2009 (incorporated by reference in § 431.15). References to “IEC” above refer to IEC 60034-1, 60034-12, 60050-411, and 60072-1 (incorporated by reference in § 431.15), as applicable.

IEC means the International Electrotechnical Commission.

IEEE means the Institute of Electrical and Electronics Engineers, Inc.

NEMA means the National Electrical Manufacturers Association.

Nominal full-load efficiency means, with respect to an electric motor, a representative value of efficiency selected from the “nominal efficiency” column of Table 12-10, NEMA MG1-2009, (incorporated by reference, see § 431.15), that is not greater than the average full-load efficiency of a population of motors of the same design.

NEMA design B general purpose electric motor [Reserved]

NEMA Design B motor means a squirrel-cage motor that is:

(1) Designed to withstand full-voltage starting;

(2) Develops locked-rotor, break-down, and pull-up torques adequate for general application as specified in sections 12.38, 12.39 and 12.40 of NEMA MG1-2009 (incorporated by reference, see § 431.15);

(3) Draws locked-rotor current not to exceed the values shown in section

12.35.1 for 60 hertz and 12.35.2 for 50 hertz of NEMA MG1-2009; and

(4) Has a slip at rated load of less than 5 percent for motors with fewer than 10 poles.

Open motor means an electric motor having ventilating openings which permit passage of external cooling air over and around the windings of the machine.

Special purpose motor means any motor, other than a general purpose motor or definite purpose motor, which has special operating characteristics or special mechanical construction, or both, designed for a particular application.

Total power loss means that portion of the energy used by an electric motor not converted to rotational mechanical power, expressed in percent.

[69 FR 61923, Oct. 21, 2004, as amended at 74 FR 12071, Mar. 23, 2009; 77 FR 26633, May 4, 2012]

TEST PROCEDURES, MATERIALS INCORPORATED AND METHODS OF DETERMINING EFFICIENCY

§ 431.14 Sources for information and guidance.

(a) *General*. The standards listed in this paragraph are referred to in the DOE procedures for testing laboratories, and recognition of accreditation bodies and certification programs but are not incorporated by reference. These sources are given here for information and guidance.

(b) *NVLAP*. National Voluntary Laboratory Accreditation Program, National Institute of Standards and Technology, 100 Bureau Drive, M/S 2140, Gaithersburg, MD 20899-2140, 301-975-4016, or go to <http://www.nist.gov/nvlap/>. Also see <http://www.nist.gov/nvlap/nvlap-handbooks.cfm>.

(1) NVLAP Handbook 150, Procedures and General Requirements, February 2006.

(2) NVLAP Handbook 150-10, Efficiency of Electric Motors, February 2007.

(3) NIST Handbook 150-10 Checklist, Efficiency of Electric Motors Program, (2007-05-04).

(4) NVLAP Lab Bulletin Number: LB-42-2009, Changes to NVLAP Efficiency

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of Electric Motors Program, March 19, 2009.

(c) *ISO/IEC*. International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland/International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland.

(1) ISO/IEC Guide 25, General requirements for the competence of calibration and testing laboratories, 1990.

(2) ISO Guide 27, Guidelines for corrective action to be taken by a certification body in the event of either misapplication of its mark of conformity to a product, or products which bear the mark of the certification body being found to subject persons or property to risk, 1983.

(3) ISO/IEC Guide 28, General rules for a model third-party certification system for products, 2004.

(4) ISO/IEC Guide 58, Calibration and testing laboratory accreditation systems—General requirements for operation and recognition, 1993.

(5) ISO/IEC Guide 65, General requirements for bodies operating product certification systems, 1996.

[77 FR 26634, May 4, 2012]

§ 431.15 Materials incorporated by reference.

(a) *General*. The Department of Energy incorporates by reference the following standards and test procedures into subpart B of part 431. The Director of the Federal Register has approved the material listed for incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to a standard by the standard-setting organization will not affect DOE regulations unless and until DOE amends its test procedures. Material is incorporated as it exists on the date of the approval, and a notice of any change in the material will be published in the FEDERAL REGISTER. All approved material is available for inspection at the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW., Washington, DC 20024, (202) 586-2945, or go to http://www1.eere.energy.gov/buildings/appliance_standards/. Also, this mate-

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rial is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(b) *CSA*. Canadian Standards Association, Sales Department, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, L4W 5N6, Canada, 1-800-463-6727, or go to <http://www.shopcsa.ca/onlinestore/welcome.asp>.

(1) CSA C390-10, Test methods, marking requirements, and energy efficiency levels for three-phase induction motors, March 2010, IBR approved for §§ 431.12; 431.19; 431.20; appendix B to subpart B of part 431.

(2) [Reserved]

(c) *IEC*. International Electrotechnical Commission Central Office, 3, rue de Varembe, P.O. Box 131, CH-1211 GENEVA 20, Switzerland, +41 22 919 02 11, or go to <http://webstore.iec.ch>.

(1) IEC 60034-1 Edition 12.0 2010-02, (“IEC 60034-1”), Rotating Electrical Machines, Part 1: Rating and Performance, February 2010, IBR approved as follows: section 4: Duty, clause 4.2.1 and Figure 1, IBR approved for § 431.12.

(2) IEC 60034-12 Edition 2.1 2007-09, (“IEC 60034-12”), Rotating Electrical Machines, Part 12: Starting Performance of Single-Speed Three-Phase Cage Induction Motors, September 2007, IBR approved as follows: clauses 5.2, 5.4, 6, and 8, and Tables 1, 2, 3, 4, 5, 6, and 7, IBR approved for § 431.12.

(3) IEC 60050-411, International Electrotechnical Vocabulary Chapter 411: Rotating machines, 1996, IBR approved as follows: sections 411-33-07 and 411-37-26, IBR approved for § 431.12.

(4) IEC 60072-1, Dimensions and Output Series for Rotating Electrical Machines—Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080, 1991, IBR approved as follows: clauses 2, 3, 4.1, 6.1, 7, and 10, and Tables 1, 2 and 4, IBR approved for § 431.12.

(d) *IEEE*. Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, 1-800-678-IEEE (4333), or <http://www.ieee.org/web/publications/home/index.html>.

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(1) IEEE Std 112-2004, Test Procedure for Polyphase Induction Motors and Generators, approved February 9, 2004, IBR approved as follows: section 6.4, Efficiency Test Method B, Input-Output with Loss Segregation, IBR approved for §§ 431.12; 431.19; 431.20; appendix B to subpart B of part 431.

(2) [Reserved]

(e) NEMA. National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1752, Rosslyn, Virginia 22209, 703-841-3200, or go to <http://www.nema.org/>.

(1) NEMA Standards Publication MG1-2009 (“NEMA MG1-2009”), Motors and Generators, copyright 2009, IBR approved as follows:

(i) Section I, General Standards Applying to All Machines, Part 1, Referenced Standards and Definitions, paragraphs 1.18.1, 1.18.1.1, 1.19.1.1, 1.19.1.2, 1.19.1.3, and 1.40.1, IBR approved for § 431.12;

(ii) Section I, General Standards Applying to All Machines, Part 4, Dimensions, Tolerances, and Mounting, paragraphs 4.1, 4.2.1, 4.2.2, 4.4.1, 4.4.2, 4.4.4, 4.4.5, and 4.4.6, Figures 4-1, 4-2, 4-3, 4-4, and 4-5, and Table 4-2, IBR approved for § 431.12;

(iii) Section II, Small (Fractional) and Medium (Integral) Machines, Part 12, Tests and Performance—AC and DC Motors:

(A) Paragraphs 12.35.1, 12.35.2, 12.38.1, 12.38.2, 12.39.1, 12.39.2, and 12.40.1, 12.40.2, and Tables 12-2, 12-3, and 12-10, IBR approved for § 431.12;

(B) Paragraph 12.58.1, IBR approved for § 431.12 and appendix B to subpart B of part 431;

(C) Paragraph 12.58.2, IBR approved for § 431.31.

(iv) Section II, Small (Fractional) and Medium (Integral) Machines, Part 14, Application Data—AC and DC Small and Medium Machines, paragraphs 14.2 and 14.3, IBR approved for § 431.12.

(2) NEMA Standards Publication MG1-1967, (“NEMA MG1-1967”), Motors and Generators, January 1968, IBR approved as follows:

(i) Part 11, Dimensions, IBR approved for § 431.12;

(ii) Part 13, Frame Assignments—A-C Integral-Horsepower Motors, IBR approved for § 431.12.

(f) NFPA. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471, 617-770-3000, or go to <http://nfpa.org/>.

(1) NFPA 20, 2010 Edition, Standard for the Installation of Stationary Pumps for Fire Protection, section 9.5, IBR approved for § 431.12.

(2) (Reserved)

[77 FR 26634, May 4, 2012]

§ 431.16 Test procedures for the measurement of energy efficiency.

For purposes of 10 CFR part 431 and EPCA, the test procedures for measuring the energy efficiency of an electric motor shall be the test procedures specified in appendix B to this subpart B.

§ 431.17 Determination of efficiency.

When a party determines the energy efficiency of an electric motor in order to comply with an obligation imposed on it by or pursuant to Part C of Title III of EPCA, 42 U.S.C. 6311-6316, this Section applies. This section does not apply to enforcement testing conducted pursuant to § 431.192.

(a) *Provisions applicable to all electric motors*—(1) *General requirements*. The average full load efficiency of each basic model of electric motor must be determined either by testing in accordance with § 431.16 of this subpart, or by application of an alternative efficiency determination method (AEDM) that meets the requirements of paragraphs (a)(2) and (3) of this section, provided, however, that an AEDM may be used to determine the average full load efficiency of one or more of a manufacturer's basic models only if the average full load efficiency of at least five of its other basic models is determined through testing.

(2) *Alternative efficiency determination method*. An AEDM applied to a basic model must be:

(i) Derived from a mathematical model that represents the mechanical and electrical characteristics of that basic model, and

(ii) Based on engineering or statistical analysis, computer simulation or modeling, or other analytic evaluation of performance data.

(3) *Substantiation of an alternative efficiency determination method*. Before an

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AEDM is used, its accuracy and reliability must be substantiated as follows:

(i) The AEDM must be applied to at least five basic models that have been tested in accordance with § 431.16, and

(ii) The predicted total power loss for each such basic model, calculated by applying the AEDM, must be within plus or minus ten percent of the mean total power loss determined from the testing of that basic model.

(4) *Subsequent verification of an AEDM.* (i) Each manufacturer shall periodically select basic models representative of those to which it has applied an AEDM, and for each basic model selected shall either:

(A) Subject a sample of units to testing in accordance with §§ 431.16 and 431.17(b)(2) by an accredited laboratory that meets the requirements of § 431.18;

(B) Have a certification body recognized under § 431.20 certify its nominal full load efficiency; or

(C) Have an independent state-registered professional engineer, who is qualified to perform an evaluation of electric motor efficiency in a highly competent manner and who is not an employee of the manufacturer, review the manufacturer's representations and certify that the results of the AEDM accurately represent the total power loss and nominal full load efficiency of the basic model.

(ii) Each manufacturer that has used an AEDM under this section shall have available for inspection by the Department of Energy records showing: the method or methods used; the mathematical model, the engineering or statistical analysis, computer simulation or modeling, and other analytic evaluation of performance data on which the AEDM is based; complete test data, product information, and related information that the manufacturer has generated or acquired pursuant to paragraphs (a)(3) and (a)(4)(i) of this section; and the calculations used to determine the average full load efficiency and total power losses of each basic model to which the AEDM was applied.

(iii) If requested by the Department, the manufacturer shall conduct simulations to predict the performance of particular basic models of electric motors specified by the Department, anal-

yses of previous simulations conducted by the manufacturer, sample testing of basic models selected by the Department, or a combination of the foregoing.

(5) *Use of a certification program or accredited laboratory.* (i) A manufacturer may have a certification program, that DOE has classified as nationally recognized under § 431.20, certify the nominal full load efficiency of a basic model of electric motor, and issue a certificate of conformity for the motor.

(ii) For each basic model for which a certification program is not used as described in paragraph (a)(5)(i) of this section, any testing of the motor pursuant to paragraphs (a)(1) through (3) of this section to determine its energy efficiency must be carried out in accordance with paragraph (b) of this section, in an accredited laboratory that meets the requirements of § 431.18. (This includes testing of the basic model, pursuant to paragraph (a)(3)(i) of this section, to substantiate an AEDM.)

(b) *Additional testing requirements applicable when a certification program is not used—*(1) *Selection of basic models for testing.* (i) Basic models must be selected for testing in accordance with the following criteria:

(A) Two of the basic models must be among the five basic models with the highest unit volumes of production by the manufacturer in the prior year, or during the prior 12 calendar month period beginning in 1997,¹ whichever is later;

(B) The basic models should be of different horsepower without duplication;

(C) The basic models should be of different frame number series without duplication; and

(D) Each basic model should be expected to have the lowest nominal full load efficiency among the basic models with the same rating ("rating" as used here has the same meaning as it has in the definition of "basic model").

(ii) In any instance where it is impossible for a manufacturer to select basic models for testing in accordance with

¹In identifying these five basic models, any electric motor that does not comply with § 431.25 shall be excluded from consideration.

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all of these criteria, the criteria shall be given priority in the order in which they are listed. Within the limits imposed by the criteria, basic models shall be selected randomly.

(2) *Selection of units for testing.* For each basic model selected for testing,² a sample of units shall be selected at random and tested. The sample shall be comprised of production units of the basic model, or units that are representative of such production units. The sample size shall be not fewer than five units, except that when fewer than five units of a basic model would be produced over a reasonable period of time (approximately 180 days), then each unit shall be tested. In a test of compliance with a represented average or nominal efficiency:

(i) The average full-load efficiency of the sample \bar{X} which is defined by

$$\bar{X} = \frac{1}{n} \sum_{i=1}^n X_i,$$

where X_i is the measured full-load efficiency of unit i and n is the number of units tested, shall satisfy the condition:

$$\bar{X} \geq \frac{100}{1 + 1.05 \left(\frac{100}{RE} - 1 \right)}$$

where RE is the represented nominal full-load efficiency, and

(ii) The lowest full-load efficiency in the sample X_{\min} , which is defined by

$$X_{\min} = \min (X_i)$$

shall satisfy the condition

$$\bar{X}_{\min} \geq \frac{100}{1 + 1.15 \left(\frac{100}{RE} - 1 \right)}$$

(3) *Substantiation of an alternative efficiency determination method.* The basic models tested under § 431.17(a)(3)(i) must be selected for testing in accordance with paragraph (b)(1) of this section, and units of each such basic

model must be tested in accordance with paragraph (b)(2) of this section by an accredited laboratory that meets the requirements of § 431.18.

§ 431.18 Testing laboratories.

(a) Testing pursuant to § 431.17(a)(5)(ii) must be conducted in an accredited laboratory for which the accreditation body was:

(1) The National Institute of Standards and Technology/National Voluntary Laboratory Accreditation Program (NIST/NVLAP); or

(2) A laboratory accreditation body having a mutual recognition arrangement with NIST/NVLAP; or

(3) An organization classified by the Department, pursuant to § 431.19, as an accreditation body.

(b) NIST/NVLAP is under the auspices of the National Institute of Standards and Technology (NIST)/National Voluntary Laboratory Accreditation Program (NVLAP), which is part of the U.S. Department of Commerce. NIST/NVLAP accreditation is granted on the basis of conformance with criteria published in 15 CFR Part 285. The National Voluntary Laboratory Accreditation Program, "Procedures and General Requirements," NIST Handbook 150-10, February 2007, and Lab Bulletin LB-42-2009, Efficiency of Electric Motors Program, (referenced for guidance only, see § 431.14) present the technical requirements of NVLAP for the Efficiency of Electric Motors field of accreditation. This handbook supplements NIST Handbook 150, National Voluntary Laboratory Accreditation Program "Procedures and General Requirements," which contains 15 CFR part 285 plus all general NIST/NVLAP procedures, criteria, and policies. Information regarding NIST/NVLAP and its Efficiency of Electric Motors Program (EEM) can be obtained from NIST/NVLAP, 100 Bureau Drive, Mail Stop 2140, Gaithersburg, MD 20899-2140, (301) 975-4016 (telephone), or (301) 926-2884 (fax).

[69 FR 61923, Oct. 21, 2004, as amended at 77 FR 26635, May 4, 2012]

²Components of similar design may be substituted without requiring additional testing if the represented measures of energy consumption continue to satisfy the applicable sampling provision.

§ 431.19 Department of Energy recognition of accreditation bodies.

(a) *Petition.* To be classified by the Department of Energy as an accreditation body, an organization must submit a petition to the Department requesting such classification, in accordance with paragraph (c) of this section and § 431.21. The petition must demonstrate that the organization meets the criteria in paragraph (b) of this section.

(b) *Evaluation criteria.* To be classified as an accreditation body by the Department, the organization must meet the following criteria:

(1) It must have satisfactory standards and procedures for conducting and administering an accreditation system and for granting accreditation. This must include provisions for periodic audits to verify that the laboratories receiving its accreditation continue to conform to the criteria by which they were initially accredited, and for withdrawal of accreditation where such conformance does not occur, including failure to provide accurate test results.

(2) It must be independent of electric motor manufacturers, importers, distributors, private labelers or vendors. It cannot be affiliated with, have financial ties with, be controlled by, or be under common control with any such entity.

(3) It must be qualified to perform the accrediting function in a highly competent manner.

(4) It must be expert in the content and application of the test procedures and methodologies in IEEE Std 112–2004 Test Method B or CSA C390–10, (incorporated by reference, see § 431.15).

(c) *Petition format.* Each petition requesting classification as an accreditation body must contain a narrative statement as to why the organization meets the criteria set forth in paragraph (b) of this section, must be signed on behalf of the organization by an authorized representative, and must be accompanied by documentation that supports the narrative statement. The following provides additional guidance:

(1) *Standards and procedures.* A copy of the organization's standards and procedures for operating an accreditation system and for granting accreditation should accompany the petition.

(2) *Independent status.* The petitioning organization should identify and describe any relationship, direct or indirect, that it has with an electric motor manufacturer, importer, distributor, private labeler, vendor, trade association or other such entity, as well as any other relationship it believes might appear to create a conflict of interest for it in performing as an accreditation body for electric motor testing laboratories. It should explain why it believes such relationship(s) would not compromise its independence as an accreditation body.

(3) *Qualifications to do accrediting.* Experience in accrediting should be discussed and substantiated by supporting documents. Of particular relevance would be documentary evidence that establishes experience in the application of guidelines contained in the ISO/IEC Guide 58, *Calibration and testing laboratory accreditation systems—General requirements for operation and recognition*, as well as experience in overseeing compliance with the guidelines contained in the ISO/IEC Guide 25, *General Requirements for the Competence of Calibration and Testing Laboratories* (referenced for guidance only, see § 431.14).

(4) Expertise in electric motor test procedures. The petition should set forth the organization's experience with the test procedures and methodologies in IEEE Std 112–2004 Test Method B and CSA C390–10, (incorporated by reference, see § 431.15). This part of the petition should include items such as, but not limited to, a description of prior projects and qualifications of staff members. Of particular relevance would be documentary evidence that establishes experience in applying the guidelines contained in the ISO/IEC Guide 25, *General Requirements for the Competence of Calibration and Testing Laboratories*, (referenced for guidance only, see § 431.14) to energy efficiency testing for electric motors.

(d) *Disposition.* The Department will evaluate the petition in accordance with § 431.21, and will determine whether the applicant meets the criteria in paragraph (b) of this section to be classified as an accrediting body.

[69 FR 61923, Oct. 21, 2004, as amended at 77 FR 26635, May 4, 2012]

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§ 431.20 Department of Energy recognition of nationally recognized certification programs.

(a) *Petition.* For a certification program to be classified by the Department of Energy as being nationally recognized in the United States for the purposes of Section 345(c) of EPCA ("nationally recognized"), the organization operating the program must submit a petition to the Department requesting such classification, in accordance with paragraph (c) of this Section and § 431.21. The petition must demonstrate that the program meets the criteria in paragraph (b) of this section.

(b) *Evaluation criteria.* For a certification program to be classified by the Department as nationally recognized, it must meet the following criteria:

(1) It must have satisfactory standards and procedures for conducting and administering a certification system, including periodic follow up activities to assure that basic models of electric motor continue to conform to the efficiency levels for which they were certified, and for granting a certificate of conformity.

(2) It must be independent of electric motor manufacturers, importers, distributors, private labelers or vendors. It cannot be affiliated with, have financial ties with, be controlled by, or be under common control with any such entity.

(3) It must be qualified to operate a certification system in a highly competent manner.

(4) It must be expert in the content and application of the test procedures and methodologies in IEEE Std 112-2004 Test Method B or CSA C390-10, (incorporated by reference, see § 431.15). It must have satisfactory criteria and procedures for the selection and sampling of electric motors tested for energy efficiency.

(c) *Petition format.* Each petition requesting classification as a nationally recognized certification program must contain a narrative statement as to why the program meets the criteria listed in paragraph (b) of this section, must be signed on behalf of the organization operating the program by an authorized representative, and must be accompanied by documentation that

supports the narrative statement. The following provides additional guidance as to the specific criteria:

(1) *Standards and procedures.* A copy of the standards and procedures for operating a certification system and for granting a certificate of conformity should accompany the petition.

(2) *Independent status.* The petitioning organization should identify and describe any relationship, direct or indirect, that it or the certification program has with an electric motor manufacturer, importer, distributor, private labeler, vendor, trade association or other such entity, as well as any other relationship it believes might appear to create a conflict of interest for the certification program in operating a certification system for compliance by electric motors with energy efficiency standards. It should explain why it believes such relationship would not compromise its independence in operating a certification program.

(3) *Qualifications to operate a certification system.* Experience in operating a certification system should be discussed and substantiated by supporting documents. Of particular relevance would be documentary evidence that establishes experience in the application of guidelines contained in the ISO/IEC Guide 65, *General requirements for bodies operating product certification systems*, ISO/IEC Guide 27, *Guidelines for corrective action to be taken by a certification body in the event of either misapplication of its mark of conformity to a product, or products which bear the mark of the certification body being found to subject persons or property to risk*, and ISO/IEC Guide 28, *General rules for a model third-party certification system for products*, as well as experience in overseeing compliance with the guidelines contained in the ISO/IEC Guide 25, *General requirements for the competence of calibration and testing laboratories* (referenced for guidance only, see § 431.14).

(4) *Expertise in electric motor test procedures.* The petition should set forth the program's experience with the test procedures and methodologies in IEEE Std 112-2004 Test Method B or CSA C390-10, (incorporated by reference, see § 431.15). This part of the petition should include

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items such as, but not limited to, a description of prior projects and qualifications of staff members. Of particular relevance would be documentary evidence that establishes experience in applying guidelines contained in the ISO/IEC Guide 25, General Requirements for the Competence of Calibration and Testing Laboratories (referenced for guidance only, see 431.14) to energy efficiency testing for electric motors.

(d) *Disposition.* The Department will evaluate the petition in accordance with § 431.21, and will determine whether the applicant meets the criteria in paragraph (b) of this section for classification as a nationally recognized certification program.

[69 FR 61923, Oct. 21, 2004, as amended at 77 FR 26635, May 4, 2012]

§ 431.21 Procedures for recognition and withdrawal of recognition of accreditation bodies and certification programs.

(a) *Filing of petition.* Any petition submitted to the Department pursuant to §§ 431.19(a) or 431.20(a), shall be entitled “Petition for Recognition” (“Petition”) and must be submitted, in triplicate to the Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585–0121. In accordance with the provisions set forth in 10 CFR 1004.11, any request for confidential treatment of any information contained in such a Petition or in supporting documentation must be accompanied by a copy of the Petition or supporting documentation from which the information claimed to be confidential has been deleted.

(b) *Public notice and solicitation of comments.* DOE shall publish in the FEDERAL REGISTER the Petition from which confidential information, as determined by DOE, has been deleted in accordance with 10 CFR 1004.11 and shall solicit comments, data and information on whether the Petition should be granted. The Department shall also make available for inspection and copying the Petition’s supporting documentation from which confidential information, as determined by DOE, has been deleted in accordance with 10 CFR

1004.11. Any person submitting written comments to DOE with respect to a Petition shall also send a copy of such comments to the petitioner.

(c) *Responsive statement by the petitioner.* A petitioner may, within 10 working days of receipt of a copy of any comments submitted in accordance with paragraph (b) of this section, respond to such comments in a written statement submitted to the Assistant Secretary for Energy Efficiency and Renewable Energy. A petitioner may address more than one set of comments in a single responsive statement.

(d) *Public announcement of interim determination and solicitation of comments.* The Assistant Secretary for Energy Efficiency and Renewable Energy shall issue an interim determination on the Petition as soon as is practicable following receipt and review of the Petition and other applicable documents, including, but not limited to, comments and responses to comments. The petitioner shall be notified in writing of the interim determination. DOE shall also publish in the FEDERAL REGISTER the interim determination and shall solicit comments, data and information with respect to that interim determination. Written comments and responsive statements may be submitted as provided in paragraphs (b) and (c) of this section.

(e) *Public announcement of final determination.* The Assistant Secretary for Energy Efficiency and Renewable Energy shall as soon as practicable, following receipt and review of comments and responsive statements on the interim determination, publish in the FEDERAL REGISTER a notice of final determination on the Petition.

(f) *Additional information.* The Department may, at any time during the recognition process, request additional relevant information or conduct an investigation concerning the Petition. The Department’s determination on a Petition may be based solely on the Petition and supporting documents, or may also be based on such additional information as the Department deems appropriate.

(g) *Withdrawal of recognition—(1) Withdrawal by the Department.* If the Department believes that an accreditation body or certification program that

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has been recognized under §§ 431.19 or 431.20, respectively, is failing to meet the criteria of paragraph (b) of the section under which it is recognized, the Department will so advise such entity and request that it take appropriate corrective action. The Department will give the entity an opportunity to respond. If after receiving such response, or no response, the Department believes satisfactory correction has not been made, the Department will withdraw its recognition from that entity.

(2) *Voluntary withdrawal.* An accreditation body or certification program may withdraw itself from recognition by the Department by advising the Department in writing of such withdrawal. It must also advise those that use it (for an accreditation body, the testing laboratories, and for a certification organization, the manufacturers) of such withdrawal.

(3) *Notice of withdrawal of recognition.* The Department will publish in the FEDERAL REGISTER a notice of any withdrawal of recognition that occurs pursuant to this paragraph.

ENERGY CONSERVATION STANDARDS

§ 431.25 Energy conservation standards and effective dates.

(a) Except as provided for fire pump electric motors in paragraph (b) of this section, each general purpose electric motor (subtype I) with a power rating of 1 horsepower or greater, but not greater than 200 horsepower, including a NEMA Design B or an equivalent IEC Design N motor that is a general purpose electric motor (subtype I), manufactured (alone or as a component of another piece of equipment) on or after December 19, 2010, shall have a nominal full-load efficiency that is not less than the following:

TABLE 1—NOMINAL FULL-LOAD EFFICIENCIES OF GENERAL PURPOSE ELECTRIC MOTORS (SUBTYPE I), EXCEPT FIRE PUMP ELECTRIC MOTORS

Motor horsepower/standard kilowatt equivalent	Nominal full-load efficiency					
	Open motors (number of poles)			Enclosed motors (number of poles)		
	6	4	2	6	4	2
1/75	82.5	85.5	77.0	82.5	85.5	77.0
1.5/1.1	86.5	86.5	84.0	87.5	86.5	84.0
2/1.5	87.5	86.5	85.5	88.5	86.5	85.5
3/2.2	88.5	89.5	85.5	89.5	89.5	86.5
5/3.7	89.5	89.5	86.5	89.5	89.5	88.5
7.5/5.5	90.2	91.0	88.5	91.0	91.7	89.5
10/7.5	91.7	91.7	89.5	91.0	91.7	90.2
15/11	91.7	93.0	90.2	91.7	92.4	91.0
20/15	92.4	93.0	91.0	91.7	93.0	91.0
25/18.5	93.0	93.6	91.7	93.0	93.6	91.7
30/22	93.6	94.1	91.7	93.0	93.6	91.7
40/30	94.1	94.1	92.4	94.1	94.1	92.4
50/37	94.1	94.5	93.0	94.1	94.5	93.0
60/45	94.5	95.0	93.6	94.5	95.0	93.6
75/55	94.5	95.0	93.6	94.5	95.4	93.6
100/75	95.0	95.4	93.6	95.0	95.4	94.1
125/90	95.0	95.4	94.1	95.0	95.4	95.0
150/110	95.4	95.8	94.1	95.8	95.8	95.0
200/150	95.4	95.8	95.0	95.8	96.2	95.4

(b) Each fire pump electric motor that is a general purpose electric motor (subtype I) or general purpose electric motor (subtype II) manufactured (alone or as a component of an-

other piece of equipment) on or after December 19, 2010, shall have a nominal full-load efficiency that is not less than the following:

TABLE 2—NOMINAL FULL-LOAD EFFICIENCIES OF FIRE PUMP ELECTRIC MOTORS

Motor horsepower/ standard kilowatt equivalent	Nominal full-load efficiency							
	Open motors (number of poles)				Enclosed motors (number of poles)			
	8	6	4	2	8	6	4	2
1/75	74.0	80.0	82.5	.....	74.0	80.0	82.5	75.5
1.5/1.1	75.5	84.0	84.0	82.5	77.0	85.5	84.0	82.5
2/1.5	85.5	85.5	84.0	84.0	82.5	86.5	84.0	84.0
3/2.2	86.5	86.5	86.5	84.0	84.0	87.5	87.5	85.5
5/3.7	87.5	87.5	87.5	85.5	85.5	87.5	87.5	87.5
7.5/5.5	88.5	88.5	88.5	87.5	85.5	89.5	89.5	88.5
10/7.5	89.5	90.2	89.5	88.5	88.5	89.5	89.5	89.5
15/11	89.5	90.2	91.0	89.5	88.5	90.2	91.0	90.2
20/15	90.2	91.0	91.0	90.2	89.5	90.2	91.0	90.2
25/18.5	90.2	91.7	91.7	91.0	89.5	91.7	92.4	91.0
30/22	91.0	92.4	92.4	91.0	91.0	91.7	92.4	91.0
40/30	91.0	93.0	93.0	91.7	91.0	93.0	93.0	91.7
50/37	91.7	93.0	93.0	92.4	91.7	93.0	93.0	92.4
60/45	92.4	93.6	93.6	93.0	91.7	93.6	93.6	93.0
75/55	93.6	93.6	94.1	93.0	93.0	93.6	94.1	93.0
100/75	93.6	94.1	94.1	93.0	93.0	94.1	94.5	93.6
125/90	93.6	94.1	94.5	93.6	93.6	94.1	94.5	94.5
150/110	93.6	94.5	95.0	93.6	93.6	95.0	95.0	94.5
200/150	93.6	94.5	95.0	94.5	94.1	95.0	95.0	95.0
250/186	94.5	95.4	95.4	94.5	94.5	95.0	95.0	95.4
300/224 .....	.....	95.4	95.4	95.0	.....	95.0	95.4	95.4
350/261 .....	.....	95.4	95.4	95.0	.....	95.0	95.4	95.4
400/298 .....	.....	.....	95.4	95.4	.....	.....	95.4	95.4
450/336 .....	.....	.....	95.8	95.8	.....	.....	95.4	95.4
500/373 .....	.....	.....	95.8	95.8	.....	.....	95.8	95.4

(c) Except as provided for fire pump electric motors in paragraph (b) of this section, each general purpose electric motor (subtype II) with a power rating of 1 horsepower or greater, but not greater than 200 horsepower, including a NEMA Design B or an equivalent IEC

Design N motor that is a general purpose electric motor (subtype II), manufactured (alone or as a component of another piece of equipment) on or after December 19, 2010, shall have a nominal full-load efficiency that is not less than the following:

TABLE 3—NOMINAL FULL-LOAD EFFICIENCIES OF GENERAL PURPOSE ELECTRIC MOTORS (SUBTYPE II), EXCEPT FIRE PUMP ELECTRIC MOTORS

Motor horsepower/ standard kilowatt equivalent	Nominal full-load efficiency							
	Open motors (number of poles)				Enclosed motors (number of poles)			
	8	6	4	2	8	6	4	2
1/75	74.0	80.0	82.5	.....	74.0	80.0	82.5	75.5
1.5/1.1	75.5	84.0	84.0	82.5	77.0	85.5	84.0	82.5
2/1.5	85.5	85.5	84.0	84.0	82.5	86.5	84.0	84.0
3/2.2	86.5	86.5	86.5	84.0	84.0	87.5	87.5	85.5
5/3.7	87.5	87.5	87.5	85.5	85.5	87.5	87.5	87.5
7.5/5.5	88.5	88.5	88.5	87.5	85.5	89.5	89.5	88.5
10/7.5	89.5	90.2	89.5	88.5	88.5	89.5	89.5	89.5
15/11	89.5	90.2	91.0	89.5	88.5	90.2	91.0	90.2
20/15	90.2	91.0	91.0	90.2	89.5	90.2	91.0	90.2
25/18.5	90.2	91.7	91.7	91.0	89.5	91.7	92.4	91.0
30/22	91.0	92.4	92.4	91.0	91.0	91.7	92.4	91.0
40/30	91.0	93.0	93.0	91.7	91.0	93.0	93.0	91.7
50/37	91.7	93.0	93.0	92.4	91.7	93.0	93.0	92.4
60/45	92.4	93.6	93.6	93.0	91.7	93.6	93.6	93.0
75/55	93.6	93.6	94.1	93.0	93.0	93.6	94.1	93.0
100/75	93.6	94.1	94.1	93.0	93.0	94.1	94.5	93.6
125/90	93.6	94.1	94.5	93.6	93.6	94.1	94.5	94.5
150/110	93.6	94.5	95.0	93.6	93.6	95.0	95.0	94.5
200/150	93.6	94.5	95.0	94.5	94.1	95.0	95.0	95.0

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(d) Each NEMA Design B or an equivalent IEC Design N motor that is a general purpose electric motor (subtype I) or general purpose electric motor (subtype II), excluding fire pump electric motors, with a power rating of more than 200 horsepower, but not

greater than 500 horsepower, manufactured (alone or as a component of another piece of equipment) on or after December 19, 2010, shall have a nominal full-load efficiency that is not less than the following:

TABLE 4—NOMINAL FULL-LOAD EFFICIENCIES OF NEMA DESIGN B GENERAL PURPOSE ELECTRIC MOTORS (SUBTYPE I AND II), EXCEPT FIRE PUMP ELECTRIC MOTORS

Motor horsepower/ standard kilowatt equivalent	Nominal full-load efficiency							
	Open motors (number of poles)				Enclosed motors (number of poles)			
	8	6	4	2	8	6	4	2
250/186	94.5	95.4	95.4	94.5	94.5	95.0	95.0	95.4
300/224	95.4	95.4	95.0	.....	95.0	95.4	95.4
350/261	95.4	95.4	95.0	.....	95.0	95.4	95.4
400/298	95.4	95.4	.....	.....	95.4	95.4
450/336	95.8	95.8	.....	.....	95.4	95.4
500/373	95.8	95.8	.....	.....	95.8	95.4

(e) For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a horsepower or kilowatt rating between two horsepower or two kilowatt ratings listed in any table of energy conservation standards in paragraphs (a) through (d) of this section, each such motor shall be deemed to have a listed horsepower or kilowatt rating, determined as follows:

(1) A horsepower at or above the midpoint between the two consecutive horsepower ratings shall be rounded up to the higher of the two horsepower ratings;

(2) A horsepower below the midpoint between the two consecutive horsepower ratings shall be rounded down to the lower of the two horsepower ratings; or

(3) A kilowatt rating shall be directly converted from kilowatts to horsepower using the formula 1 kilowatt = (1/0.746) horsepower. The conversion should be calculated to three significant decimal places, and the resulting horsepower shall be rounded in accordance with paragraph (e)(1) or (e)(2) of this section, whichever applies.

(f) This section does not apply to definite purpose motors, special purpose motors, or those motors exempted by the Secretary.

[77 FR 26635, May 4, 2012]

§ 431.26 Preemption of State regulations.

Any State regulation providing for any energy conservation standard, or other requirement with respect to the energy efficiency or energy use, of an electric motor that is not identical to a Federal standard in effect under this subpart is preempted by that standard, except as provided for in Section 345(a) and 327(b) and (c) of the Act.

LABELING

§ 431.31 Labeling requirements.

(a) *Electric motor nameplate*—(1) *Required information*. The permanent nameplate of an electric motor for which standards are prescribed in § 431.25 must be marked clearly with the following information:

(i) The motor's nominal full load efficiency (as of the date of manufacture), derived from the motor's average full load efficiency as determined pursuant to this subpart; and

(ii) A Compliance Certification number ("CC number") supplied by DOE to the manufacturer or private labeler, pursuant to § 431.36(f), and applicable to that motor. Such CC number must be on the nameplate of a motor beginning 90 days after either:

(A) The manufacturer or private labeler has received the number upon submitting a Compliance Certification covering that motor, or

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(B) The expiration of 21 days from DOE's receipt of a Compliance Certification covering that motor, if the manufacturer or private labeler has not been advised by DOE that the Compliance Certification fails to satisfy § 431.36.

(2) *Display of required information.* All orientation, spacing, type sizes, type faces, and line widths to display this required information shall be the same as or similar to the display of the other performance data on the motor's permanent nameplate. The nominal full-load efficiency shall be identified either by the term "Nominal Efficiency" or "Nom. Eff." or by the terms specified in paragraph 12.58.2 of NEMA MG1-2009, (incorporated by reference, see § 431.15) as for example "NEMA Nom. Eff. ____." The Compliance Certification number issued pursuant to § 431.36 shall be in the form "CC ____."

(3) *Optional display.* The permanent nameplate of an electric motor, a separate plate, or decalcomania, may be marked with the encircled lower case letters "ee", for example,



or with some comparable designation or logo, if the motor meets the applicable standard prescribed in § 431.25, as determined pursuant to this subpart, and is covered by a Compliance Certification that satisfies § 431.36.

(b) *Disclosure of efficiency information in marketing materials.* (1) The same information that must appear on an electric motor's permanent nameplate pursuant to paragraph (a)(1) of this section, shall be prominently displayed:

(i) On each page of a catalog that lists the motor; and

(ii) In other materials used to market the motor.

(2) The "ee" logo, or other similar logo or designations, may also be used in catalogs and other materials to the same extent they may be used on labels under paragraph (a)(3) of this section.

[69 FR 61923, Oct. 21, 2004, as amended at 77 FR 26637, May 4, 2012]

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§ 431.32 Preemption of State regulations.

The provisions of § 431.31 supersede any State regulation to the extent required by Section 327 of the Act. Pursuant to the Act, all State regulations that require the disclosure for any electric motor of information with respect to energy consumption, other than the information required to be disclosed in accordance with this part, are superseded.

CERTIFICATION

§ 431.35 Applicability of certification requirements.

Section 431.36 sets forth the procedures for manufacturers to certify that electric motors comply with the applicable energy efficiency standards set forth in this subpart.

§ 431.36 Compliance Certification.

(a) *General.* A manufacturer or private labeler shall not distribute in commerce any basic model of an electric motor which is subject to an energy efficiency standard set forth in this subpart unless it has submitted to the Department a Compliance Certification certifying, in accordance with the provisions of this section, that the basic model meets the requirements of the applicable standard. The representations in the Compliance Certification must be based upon the basic model's energy efficiency as determined in accordance with the applicable requirements of this subpart. This means, in part, that either:

(1) The representations as to the basic model must be based on use of a certification organization; or

(2) Any testing of the basic model on which the representations are based must be conducted at an accredited laboratory.

(b) *Required contents—(1) General representations.* Each Compliance Certification must certify that:

(i) The nominal full load efficiency for each basic model of electric motor distributed is not less than the minimum nominal full load efficiency required for that motor by § 431.25;

(ii) All required determinations on which the Compliance Certification is based were made in compliance with

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the applicable requirements prescribed in this subpart;

(iii) All information reported in the Compliance Certification is true, accurate, and complete; and

(iv) The manufacturer or private labeler is aware of the penalties associated with violations of the Act and the regulations thereunder, and of 18 U.S.C. 1001 which prohibits knowingly making false statements to the Federal Government.

(2) *Specific data.* (i) For each rating of electric motor (as the term “rating” is defined in the definition of basic model) which a manufacturer or private labeler distributes, the Compliance Certification must report the nominal full load efficiency, determined pursuant to §§ 431.16 and 431.17, of the least efficient basic model within that rating.

(ii) The Compliance Certification must identify the basic models on which actual testing has been performed to meet the requirements of § 431.17.

(iii) The format for a Compliance Certification is set forth in appendix C of this subpart.

(c) *Optional contents.* In any Compliance Certification, a manufacturer or private labeler may at its option request that DOE provide it with a unique Compliance Certification number (“CC number”) for any brand name, trademark or other label name under which the manufacturer or private labeler distributes electric motors covered by the Certification. Such a Compliance Certification must also identify all other names, if any, under which the manufacturer or private labeler distributes electric motors, and to which the request does not apply.

(d) *Signature and submission.* A manufacturer or private labeler must submit the Compliance Certification either on its own behalf, signed by a corporate official of the company, or through a third party (for example, a trade association or other authorized representative) acting on its behalf. Where a third party is used, the Compliance Certification must identify the official of the manufacturer or private labeler who authorized the third party to make representations on the company’s behalf, and must be signed by a corporate

official of the third party. The Compliance Certification must be submitted to the Department electronically at <https://www.regulations.doe.gov/ccms>. Alternatively, the Compliance Certification may be submitted by certified mail to: Certification and Compliance Reports, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE-2J, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585-0121.

(e) *New basic models.* For electric motors, a Compliance Certification must be submitted for a new basic model only if the manufacturer or private labeler has not previously submitted to DOE a Compliance Certification, that meets the requirements of this section, for a basic model that has the same rating as the new basic model, and that has a lower nominal full load efficiency than the new basic model.

(f) *Response to Compliance Certification; Compliance Certification Number (CC number).*—(1) DOE processing of Certification. Promptly upon receipt of a Compliance Certification, the Department will determine whether the document contains all of the elements required by this section, and may, in its discretion, determine whether all or part of the information provided in the document is accurate. The Department will then advise the submitting party in writing either that the Compliance Certification does not satisfy the requirements of this section, in which case the document will be returned, or that the Compliance Certification satisfies this section. The Department will also advise the submitting party of the basis for its determination.

(2) *Issuance of CC number(s).* (i) Initial Compliance Certification. When DOE advises that the initial Compliance Certification submitted by or on behalf of a manufacturer or private labeler is acceptable, either:

(A) DOE will provide a single unique CC number, “CC _____,” to the manufacturer or private labeler, and such CC number shall be applicable to all electric motors distributed by the manufacturer or private labeler, or

(B) When required by paragraph (f)(3) of this section, DOE will provide more

than one CC number to the manufacturer or private labeler.

(ii) Subsequent Compliance Certification. When DOE advises that any other Compliance Certification is acceptable, it will provide a unique CC number for any brand name, trademark or other name when required by paragraph (f)(3) of this section.

(iii) When DOE declines to provide a CC number as requested by a manufacturer or private labeler in accordance with § 431.36(c), DOE will advise the requester of the reasons for such refusal.

(3) *Issuance of two or more CC numbers.*

(i) DOE will provide a unique CC number for each brand name, trademark or other label name for which a manufacturer or private labeler requests such a number in accordance with § 431.36(c), except as follows. DOE will not provide a CC number for any brand name, trademark or other label name

(A) For which DOE has previously provided a CC number, or

(B) That duplicates or overlaps with other names under which the manufacturer or private labeler sells electric motors.

(ii) Once DOE has provided a CC number for a particular name, that shall be the only CC number applicable to all electric motors distributed by the manufacturer or private labeler under that name.

(iii) If the Compliance Certification in which a manufacturer or private labeler requests a CC number is the initial Compliance Certification submitted by it or on its behalf, and it distributes electric motors not covered by the CC number(s) DOE provides in response to the request(s), DOE will also provide a unique CC number that shall be applicable to all of these other motors.

[69 FR 61923, Oct. 21, 2004, as amended at 76 FR 59006, Sept. 23, 2011; 77 FR 26638, May 4, 2012]

APPENDIX A TO SUBPART B OF PART 431 [RESERVED]

APPENDIX B TO SUBPART B OF PART 431—UNIFORM TEST METHOD FOR MEASURING NOMINAL FULL LOAD EFFICIENCY OF ELECTRIC MOTORS

1. *Definitions.*

Definitions contained in §§ 431.2 and 431.12 are applicable to this appendix.

2. *Test Procedures.*

Efficiency and losses shall be determined in accordance with NEMA MG1-2009, paragraph 12.58.1, “Determination of Motor Efficiency and Losses,” (incorporated by reference, see § 431.15) and either:

(1) CSA C390-10, (incorporated by reference, see § 431.15), or

(2) IEEE Std 112-2004 Test Method B, Input-Output With Loss Segregation, (incorporated by reference, see § 431.15).

3. *Amendments to test procedures.*

Any revision to IEEE Std 112-2004 Test Method B, NEMA MG1-2009, or CSA C390-10, (incorporated by reference, see § 431.15) shall not be effective for purposes of certification and compliance testing unless and until this appendix and 10 CFR Part 431 are amended to incorporate that revision.

[77 FR 26638, May 4, 2012]

APPENDIX C TO SUBPART B OF PART 431—COMPLIANCE CERTIFICATION

CERTIFICATION OF COMPLIANCE WITH ENERGY EFFICIENCY STANDARDS FOR ELECTRIC MOTORS (OFFICE OF MANAGEMENT AND BUDGET CONTROL NUMBER: 1910-1400. EXPIRES FEBRUARY 13, 2014)

An electronic form is available at <https://www.regulations.doe.gov/ccms/>.

1. Name and Address of Company (the “company”):

2. Name(s) to be Marked on Electric Motors to Which this Compliance Certification Applies:

3. If manufacturer or private labeler wishes to receive a unique Compliance Certification number for use with any particular brand name, trademark, or other label name, fill out the following two items:

A. List each brand name, trademark, or other label name for which the company requests a Compliance Certification number:

B. List other name(s), if any, under which the company sells electric motors (if not listed in item 2 above):

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Submit electronically at <https://www.regulations.doe.gov/ccms>.

Submit paper form by Certified Mail to: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies (EE-2J), Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585-0121.

This Compliance Certification reports on and certifies compliance with requirements contained in 10 CFR Part 431 (Energy Conservation Program for Certain Commercial and Industrial Equipment) and Part C of the Energy Policy and Conservation Act (Pub. L. 94-163), and amendments thereto. It is signed by a responsible official of the above named company. Attached and incorporated as part of this Compliance Certification is a Listing of Electric Motor Efficiencies. For each rating of electric motor* for which the Listing specifies the nominal full load efficiency of a basic model, the company distributes no less efficient basic model with that rating and all basic models with that rating comply with the applicable energy efficiency standard.

*For this purpose, the term "rating" means one of the combinations of an electric motor's horsepower (or standard kilowatt equivalent), number of poles, motor type, and open or enclosed construction, with respect to which §431.25 of 10 CFR Part 431 prescribes nominal full load efficiency standards.

Person to Contact for Further Information:

Name: _____

Address: _____

Telephone Number: _____

Facsimile Number: _____

If any part of this Compliance Certification, including the Attachment, was prepared by a third party organization under the provisions of 10 CFR 431.36, the company official authorizing third party representations:

Name: _____

Address: _____

Telephone Number: _____

Facsimile Number: _____

Third Party Organization Officially Acting as Representative:

Third Party Organization: _____

Responsible Person at the Organization: _____

Address: _____

Telephone Number: _____

Facsimile Number: _____

All required determinations on which this Compliance Certification is based were made in conformance with the applicable requirements in 10 CFR Part 431, subpart B. All information reported in this Compliance Certification is true, accurate, and complete. The company is aware of the penalties associated with violations of the Act and the regulations thereunder, and is also aware of the provisions contained in 18 U.S.C. 1001, which prohibits knowingly making false statements to the Federal Government.

Signature: _____

Date: _____

Name: _____

Title: _____

Firm or Organization: _____

ATTACHMENT OF CERTIFICATION OF COMPLIANCE WITH ENERGY EFFICIENCY STANDARDS FOR ELECTRIC MOTOR EFFICIENCIES

Date: _____

Name of Company: _____

Motor Type (i.e., general purpose electric motor (subtype I), fire pump electric motor, general purpose electric motor (subtype II), NEMA Design B general purpose electric motor)

Motor horsepower/standard kilowatt equivalent	Least efficient basic model—(model numbers(s)) Nominal full-load efficiency							
	Open motors (number of poles)				Enclosed motors (number of poles)			
	8	6	4	2	8	6	4	2
1/75	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
1.5/1.1	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____

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Motor horsepower/standard kilowatt equivalent	Least efficient basic model—(model numbers(s)) Nominal full-load efficiency							
	Open motors (number of poles)				Enclosed motors (number of poles)			
	8	6	4	2	8	6	4	2
2/1.5	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
3/2.2	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
5/3.7	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
Etc	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____

Note: Place an asterisk beside each reported nominal full load efficiency that is determined by actual testing rather than by application of an alternative efficiency determination method. Also list below additional basic models that were subjected to actual testing.

Basic Model means all units of a given type of electric motor (or class thereof) manufactured by a single manufacturer, and which (i) have the same rating, (ii) have electrical design characteristics that are essentially identical, and (iii) do not have any differing physical or functional characteristics that affect energy consumption or efficiency.

Rating means one of the combinations of an electric motor's horsepower (or standard kilowatt equivalent), number of poles, motor type, and open or enclosed construction, with respect to which §431.25 of 10 CFR Part 431 prescribes nominal full load efficiency standards.

MODELS ACTUALLY TESTED AND NOT PREVIOUSLY IDENTIFIED

Motor horsepower/standard kilowatt equivalent	Least efficient basic model—(model numbers(s)) Nominal full-load efficiency							
	Open motors (number of poles)				Enclosed motors (number of poles)			
	8	6	4	2	8	6	4	2
_____	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____	_____	_____
Etc	_____	_____	_____	_____	_____	_____	_____	_____

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MODELS ACTUALLY TESTED AND NOT PREVIOUSLY IDENTIFIED—Continued

Motor horsepower/standard kilowatt equivalent	Least efficient basic model—(model number(s)) Nominal full-load efficiency							
	Open motors (number of poles)				Enclosed motors (number of poles)			
	8	6	4	2	8	6	4	2

[69 FR 61923, Oct. 21, 2004, as amended at 76 FR 59006, Sept. 23, 2011]

Subpart C—Commercial Refrigerators, Freezers and Refrigerator-Freezers

SOURCE: 70 FR 60414, Oct. 18, 2005, unless otherwise noted.

§ 431.61 Purpose and scope.

This subpart contains energy conservation requirements for commercial refrigerators, freezers and refrigerator-freezers, pursuant to Part C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311–6317.

§ 431.62 Definitions concerning commercial refrigerators, freezers and refrigerator-freezers.

Air-curtain angle means:

(1) For equipment without doors and without a discharge air grille or discharge air honeycomb, the angle between a vertical line extended down from the highest point on the manufacturer's recommended load limit line and the load limit line itself, when the equipment is viewed in cross-section; and

(2) For all other equipment without doors, the angle formed between a vertical line and the straight line drawn by connecting the point at the inside edge of the discharge air opening with the point at the inside edge of the return air opening, when the equipment is viewed in cross-section.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Commercial refrigerator, freezer, and refrigerator-freezer means refrigeration equipment that—

(1) Is not a consumer product (as defined in § 430.2 of part 430);

(2) Is not designed and marketed exclusively for medical, scientific, or research purposes;

(3) Operates at a chilled, frozen, combination chilled and frozen, or variable temperature;

(4) Displays or stores merchandise and other perishable materials horizontally, semi-vertically, or vertically;

(5) Has transparent or solid doors, sliding or hinged doors, a combination of hinged, sliding, transparent, or solid doors, or no doors;

(6) Is designed for pull-down temperature applications or holding temperature applications; and

(7) Is connected to a self-contained condensing unit or to a remote condensing unit.

Commercial hybrid refrigerator, freezer, and refrigerator-freezer means a commercial refrigerator, freezer, or refrigerator-freezer that has two or more chilled and/or frozen compartments that are:

(1) In two or more different equipment families,

(2) Contained in one cabinet, and

(3) Sold as a single unit.

Door angle means:

(1) For equipment with flat doors, the angle between a vertical line and the line formed by the plane of the door, when the equipment is viewed in cross-section; and

(2) For equipment with curved doors, the angle formed between a vertical line and the straight line drawn by connecting the top and bottom points where the display area glass joins the cabinet, when the equipment is viewed in cross-section.

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Holding temperature application means a use of commercial refrigeration equipment other than a pull-down temperature application, except a blast chiller or freezer.

Horizontal Closed means equipment with hinged or sliding doors and a door angle greater than or equal to 45°.

Horizontal Open means equipment without doors and an air-curtain angle greater than or equal to 80° from the vertical.

Ice-cream freezer means a commercial freezer that is designed to operate at or below –5 °F (–21 °C) and that the manufacturer designs, markets, or intends for the storing, displaying, or dispensing of ice cream.

Integrated average temperature means the average temperature of all test package measurements taken during the test.

Lighting occupancy sensor means a device which uses passive infrared, ultrasonic, or other motion-sensing technology to automatically turn off or dim lights within the equipment when no motion is detected in the sensor's coverage area for a certain preset period of time.

Lowest application product temperature means the integrated average temperature closest to the specified rating temperature for a given piece of equipment achievable and repeatable, such that the integrated average temperature of a given unit is within ± 2 °F of the average of all integrated average temperature values for that basic model.

Night curtain means a device which is temporarily deployed to decrease air exchange and heat transfer between the refrigerated case and the surrounding environment.

Pull-down temperature application means a commercial refrigerator with doors that, when fully loaded with 12 ounce beverage cans at 90 degrees F, can cool those beverages to an average stable temperature of 38 degrees F in 12 hours or less.

Remote condensing unit means a factory-made assembly of refrigerating components designed to compress and liquefy a specific refrigerant that is remotely located from the refrigerated equipment and consists of 1 or more refrigerant compressors, refrigerant con-

densers, condenser fans and motors, and factory supplied accessories.

Scheduled lighting control means a device which automatically shuts off or dims the lighting in a display case at scheduled times throughout the day.

Self-contained condensing unit means a factory-made assembly of refrigerating components designed to compress and liquefy a specific refrigerant that is an integral part of the refrigerated equipment and consists of 1 or more refrigerant compressors, refrigerant condensers, condenser fans and motors, and factory supplied accessories.

Semivertical Open means equipment without doors and an air-curtain angle greater than or equal to 10° and less than 80° from the vertical.

Test package means a packaged material that is used as a standard product temperature-measuring device.

Vertical Closed means equipment with hinged or sliding doors and a door angle less than 45°.

Vertical Open means equipment without doors and an air-curtain angle greater than or equal to 0° and less than 10° from the vertical.

Wedge case means a commercial refrigerator, freezer, or refrigerator-freezer that forms the transition between two regularly shaped display cases.

[70 FR 60414, Oct. 18, 2005, as amended at 71 FR 71369, Dec. 8, 2006; 74 FR 1139, Jan. 9, 2009; 76 FR 12503, Mar. 7, 2011; 77 FR 10318, Feb. 21, 2012]

TEST PROCEDURES

§ 431.63 Materials incorporated by reference.

(a) *General.* We incorporate by reference the following standards into subpart C of part 431. The material listed has been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR 51. Any subsequent amendment to a standard by the standard-setting organization will not affect the DOE regulations unless and until amended by DOE. Material is incorporated as it exists on the date of the approval and a notice of any change in the material will be published in the FEDERAL REGISTER. All

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approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030 or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. Also, this material is available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, 202-586-2945, or go to: http://www1.eere.energy.gov/buildings/appliance_standards/. Standards can be obtained from the sources listed below.

(b) ANSI. American National Standards Institute, 25 W. 43rd Street, 4th Floor, New York, NY 10036, 212-642-4900, or go to <http://www.ansi.org>:

(1) ANSI /AHAM HRF-1-2004, *Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers*, approved July 7, 2004, IBR approved for § 431.64.

(2) AHAM HRF-1-2008 ("HRF-1-2008"), Association of Home Appliance Manufacturers, *Energy and Internal Volume of Refrigerating Appliances* (2008) including *Errata to Energy and Internal Volume of Refrigerating Appliances*, Correction Sheet issued November 17, 2009, IBR approved for § 431.64.

(c) AHRI. Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Blvd., Suite 500, Arlington, VA 22201, (703) 524-8800, ahri@ahrinet.org, or http://www.ahrinet.org/Content/StandardsProgram_20.aspx.

(1) ARI Standard 1200-2006, *Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets*, 2006, IBR approved for §§ 431.64 and 431.66.

(2) AHRI Standard 1200 (I-P)-2010 ("AHRI Standard 1200 (I-P)-2010"), *2010 Standard for Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets*, 2010, IBR approved for § 431.64.

[74 FR 1139, Jan. 9, 2009, as amended at 77 FR 10318, Feb. 21, 2012]

§ 431.64 Uniform test method for the measurement of energy consumption of commercial refrigerators, freezers, and refrigerator-freezers.

(a) *Scope*. This section provides the test procedures for measuring, pursuant to EPCA, the daily energy consumption in kilowatt hours per day (kWh/day) for a given product category and volume or total display area of commercial refrigerators, freezers, and refrigerator-freezers.

(b) *Testing and calculations*. Manufacturers shall use this paragraph (b) for the purposes of certifying compliance with the applicable energy conservation standards and for all representations of energy efficiency/energy use. For equipment manufactured prior to January 1, 2016, determine the daily energy consumption of each covered commercial refrigerator, freezer, or refrigerator-freezer by conducting the test procedure set forth in the Air-Conditioning and Refrigeration Institute (ARI) Standard 1200-2006, "Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets," section 3, "Definitions," section 4, "Test Requirements," and section 7, "Symbols and Subscripts" (incorporated by reference, see § 431.63). For each commercial refrigerator, freezer, or refrigerator-freezer with a self-contained condensing unit, also use ARI Standard 1200-2006, section 6, "Rating Requirements for Self-contained Commercial Refrigerated Display Merchandisers and Storage Cabinets." For each commercial refrigerator, freezer, or refrigerator-freezer with a remote condensing unit, also use ARI Standard 1200-2006, section 5, "Rating Requirements for Remote Commercial Refrigerated Display Merchandisers and Storage Cabinets." For equipment manufactured on or after January 1, 2016, determine the daily energy consumption of each covered commercial refrigerator, freezer, refrigerator-freezer or ice-cream freezer by conducting the test procedure set forth in the AHRI Standard 1200 (I-P)-2010, section 3, "Definitions," section 4, "Test Requirements," and section 7, "Symbols and Subscripts" (incorporated by reference, see § 431.63). For each commercial refrigerator, freezer,

or refrigerator-freezer with a self-contained condensing unit, also use AHRI Standard 1200 (I-P)-2010, section 6, “Rating Requirements for Self-contained Commercial Refrigerated Display Merchandisers and Storage Cabinets.” For each commercial refrigerator, freezer, or refrigerator-freezer with a remote condensing unit, also use AHRI Standard 1200 (I-P)-2010, section 5, “Rating Requirements for Remote Commercial Refrigerated Display Merchandisers and Storage Cabinets.”

(1) For display cases manufactured after January 1, 2016 and sold with night curtains installed, the night curtain shall be employed for 6 hours; 3 hours after the start of the first defrost period. Upon the completion of the 6-hour period, the night curtain shall be raised until the completion of the 24-hour test period.

(2) For commercial refrigerators, freezers, and refrigerator-freezers manufactured after January 1, 2016 and sold with lighting occupancy sensors, scheduled lighting controls, or lighting occupancy sensors and scheduled lighting controls installed on the unit, the effect on daily energy consumption will be determined by either a physical test or a calculation method and using the variables that are defined as:

CEC_A is the Alternate Compressor Energy Consumption (kilowatt-hours);

LEC_{sc} is the lighting energy consumption of internal case lights with lighting occupancy sensors and controls deployed (kilowatt-hours);

P_{li} is the rated power of lights when they are fully on (watts);

$P_{li(off)}$ is the power of lights when they are off (watts);

$P_{li(dim)}$ is the power of lights when they are dimmed (watts);

$TDEC_o$ is the total daily energy consumption with lights fully on, as measured by AHRI Standard 1200 (I-P)-2010 (kilowatt-hours);

t_{dim} is the time period which the lights are dimmed due to the use of lighting occupancy sensors or scheduled lighting controls (hours);

$t_{dim,controls}$ is the time case lighting is dimmed due to the use of lighting controls (hours);

$t_{dim,sensors}$ is the time case lighting is dimmed due to the use of lighting occupancy sensors (hours);

t_l is the time period when lights would be on without lighting occupancy sensors and/or scheduled lighting controls (24 hours);

t_{off} is the time period which the lights are off due to the use of lighting occupancy sensors and/or scheduled lighting controls (hours);

$t_{off,controls}$ is the time case lighting is off due to the use of scheduled lighting controls (hours);

$t_{off,sensors}$ is the time case lighting is off due to the use of lighting occupancy sensors (hours); and

t_{sc} is the time period when lighting is fully on with lighting occupancy sensors and scheduled lighting controls enabled (hours).

(i) For both a physical test and a calculation method, determine the estimated time off or dimmed, t_{off} or t_{dim} , as the sum of contributions from lighting occupancy sensors and scheduled lighting controls which dim or turn off lighting, respectively, as shown in the following equation:

$$t_{off} = t_{off,sensors} + t_{off,controls}$$

$$t_{dim} = t_{dim,sensors} + t_{dim,controls}$$

The sum of t_{sc} , t_{off} , and t_{dim} should equal 24 hours and the total time period during which the lights are off or dimmed shall not exceed 10.8 hours. For cases with scheduled lighting controls, the time the case lighting is off and/or dimmed due to scheduled lighting controls ($t_{off,controls}$ and/or $t_{dim,controls}$, as applicable) shall not exceed 8 hours. For cases with lighting occupancy sensors installed, the time the case lighting is off and/or dimmed due to lighting occupancy sensors ($t_{off,sensors}$ and/or $t_{dim,sensors}$, as applicable) shall not exceed 10.8 hours. For cases with lighting occupancy sensors and scheduled lighting con-

trols installed, the time the case lighting is off and/or dimmed due to lighting occupancy sensors ($t_{off,sensors}$ and/or $t_{dim,sensors}$, as applicable) shall not exceed 2.8 hours and the time the case lighting is off and/or dimmed due to scheduled lighting controls ($t_{off,controls}$ and/or $t_{dim,controls}$, as applicable) shall not exceed 8 hours.

(ii) If using a physical test to determine the daily energy consumption of a commercial refrigerator, freezer, or refrigerator-freezer sold with lighting occupancy sensors,

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scheduled lighting controls, or lighting occupancy sensors and scheduled lighting controls installed on the unit, turn off the lights for a time period equivalent to t_{off} and dim the lights for a time period equal to t_{dim} . If night curtains are also being tested on the case, the period of lights off and/or dimmed shall begin at the same time that the night curtain is being deployed and shall continue consecutively, in that order, for the appropriate number of hours.

(iii) If using a calculation method to determine the daily energy consumption of a commercial refrigerator, freezer, or refrigerator-freezer sold with lighting occupancy sensors, scheduled lighting controls, or lighting occupancy sensors and scheduled lighting controls installed on the unit—

(A) Calculate the LEC_{sc} using the following equation:

$$LEC_{sc} = \frac{(P_{li} \times t_{sc}) + (P_{li(off)} \times t_{off}) + (P_{li(dim)} \times t_{dim})}{1000}$$

(B) Calculate the CEC_A using the following equation:

$$CEC_A = 0.75 \times \frac{3.4121 \times (LEC_{sc} - P_{li} \times t_l / 1000)}{EER}$$

Where EER represents the energy efficiency ratio from Table 1 in AHRI Standard 1200 (I-P)-2010 (incorporated by reference, see § 431.63) for remote condensing equipment or the values shown in the following table for self-contained equipment:

EER FOR SELF-CONTAINED COMMERCIAL REFRIGERATED DISPLAY MERCHANDISERS AND STORAGE CABINETS

Operating temperature class	EER Btu/W
Medium	11
Low	7
Ice Cream	5

(C) For remote condensing commercial refrigerators, freezers, and refrigerator-freezers with lighting occupancy sensors, scheduled lighting controls, or lighting occupancy sensors and scheduled lighting controls installed, the revised compressor energy consumption (CEC_R) shall be the CEC_A added to the compressor energy consumption (CEC) measured in AHRI Standard 1200 (I-P)-

2010 (incorporated by reference, see § 431.63). The CDEC for the entire case shall be the sum of the CEC_R and LEC_{sc} (as calculated above) and the fan energy consumption (FEC), anti-condensate energy consumption (AEC), defrost energy consumption (DEC), and condensate evaporator pan energy consumption (PEC) (as measured in AHRI Standard 1200 (I-P)-2010).

(D) For self-contained commercial refrigerators, freezers, and refrigerator-freezers with lighting occupancy sensors, scheduled lighting controls, or lighting occupancy sensors and scheduled lighting controls installed, the TDEC for the entire case shall be the sum of total daily energy consumption as measured by the AHRI Standard 1200 (I-P)-2010 (incorporated by reference, see § 431.63) test with the lights fully on ($TDEC_o$) and CEC_A , less the decrease in lighting energy use due to lighting occupancy sensors and scheduled lighting controls, as shown in following equation.

$$TDEC = TDEC_o + CEC_A - \left(\frac{P_{li} \times t_l}{1000} - LEC_{sc} \right)$$

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(3) Conduct the testing required in paragraphs (b) introductory text, (b)(1), and (2) of this section, and determine the daily energy consumption, at the

applicable integrated average temperature in the following table. The integrated average temperature is determined using the required test method.

Category	Test procedure prior to January 1, 2016	Test procedure on or after January 1, 2016	Integrated average temperatures
(i) Refrigerator with Solid Door(s)	ARI Standard 1200–2006.	AHRI Standard 1200 (I–P)–2010	38 °F (±2 °F).
(ii) Refrigerator with Transparent Door(s)	ARI Standard 1200–2006.	AHRI Standard 1200 (I–P)–2010	38 °F (±2 °F).
(iii) Freezer with Solid Door(s)	ARI Standard 1200–2006.	AHRI Standard 1200 (I–P)–2010	0 °F (±2 °F).
(iv) Freezer with Transparent Door(s)	ARI Standard 1200–2006.	AHRI Standard 1200 (I–P)–2010	0 °F (±2 °F).
(v) Refrigerator-Freezer with Solid Door(s) ...	ARI Standard 1200–2006.	AHRI Standard 1200 (I–P)–2010	38 °F (±2 °F) for refrigerator compartment. 0 °F (±2 °F) for freezer compartment.
(vi) Commercial Refrigerator with a Self-Contained Condensing Unit Designed for Pull-Down Temperature Applications and Transparent Doors.	ARI Standard 1200–2006.	AHRI Standard 1200 (I–P)–2010	38 °F (±2 °F).
(vii) Ice-Cream Freezer	ARI Standard 1200–2006.	AHRI Standard 1200 (I–P)–2010	– 15.0 °F (±2 °F).
(viii) Commercial Refrigerator, Freezer, and Refrigerator-Freezer with a Self-Contained Condensing Unit and without Doors.	ARI Standard 1200–2006.	AHRI Standard 1200 (I–P)–2010	(A) 0 °F (±2 °F) for low temperature applications. (B) 38.0 °F (±2 °F) for medium temperature applications.
(ix) Commercial Refrigerator, Freezer, and Refrigerator-Freezer with a Remote Condensing Unit.	ARI Standard 1200–2006.	AHRI Standard 1200 (I–P)–2010	(A) 0 °F (±2 °F) for low temperature applications. (B) 38.0 °F (±2 °F) for medium temperature applications.

(A) If a piece of commercial refrigeration equipment is not able to be tested at the specified integrated average temperatures of 38 °F (±2 °F), 0 °F (±2 °F), or –15 °F (±2 °F) for refrigerators, freezers, and ice-cream freezers, respectively, the unit may be tested at the lowest application product temperature, as defined in § 431.62. For many pieces of equipment, this will be the lowest thermostat setting. For remote condensing equipment without a thermostat or other means of controlling temperature at the case, the lowest application product temperature shall be that achieved with the adjusted dew point temperature (as defined in AHRI 1200 (I–P)–2010) set to 5 degrees colder than that required to maintain the manufacturer's lowest specified application temperature.

(B) For commercial refrigeration equipment that is also tested in accordance with NSF test procedures (Type I and Type II), integrated average temperatures and ambient conditions used for NSF testing may be used in place of DOE prescribed integrated average temperatures and ambient con-

ditions provided they result in a more stringent test. That is, the measured daily energy consumption of the same unit, when tested at the rating temperatures and/or ambient conditions specified in the DOE test procedure, will be lower than or equal to the measured daily energy consumption of the unit when tested with the rating temperatures or ambient conditions used for NSF testing. The integrated average temperature measured during the test may be lower than the range specified by the DOE rating temperature specifications, provided in paragraph (b)(3) of this section, but may not exceed the upper value of the specified range. Ambient temperatures and/or humidity values may be higher than those specified in the DOE test procedure.

(4) For equipment manufactured prior to January 1, 2016, determine the volume of each covered commercial refrigerator, freezer, or refrigerator-freezer using the methodology set forth in the ANSI/AHAM HRF–1–2004, “Energy, Performance and Capacity of Household Refrigerators, Refrigerator-

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Freezers and Freezers” (incorporated by reference, see § 431.63), section 3.21, “Volume,” sections 4.1 through 4.3, “Method for Computing Total Refrigerated Volume and Total Shelf Area of Household Refrigerators and Household Wine Chillers,” and sections 5.1 through 5.3, “Method for Computing Total Refrigerated Volume and Total Shelf Area of Household Freezers.” For equipment manufactured on or after January 1, 2016, determine the volume of any covered commercial refrigerator, freezer, refrigerator-freezer, or ice-cream freezer using the method set forth in the HRF-1-2008 (incorporated by reference, see § 431.63), section 3.30, “Volume,” and sections 4.1 through 4.3, “Method for Computing Refrigerated Volume of Refrigerators, Refrigerator-Freezers, Wine Chillers and Freezers.”

[70 FR 60414, Oct. 18, 2005, as amended at 77 FR 10318, Feb. 21, 2012]

ENERGY CONSERVATION STANDARDS

§ 431.66 Energy conservation standards and their effective dates.

(a) In this section—

(1) The term “AV” means the adjusted volume (ft³) (defined as 1.63 × frozen temperature compartment volume (ft³) + chilled temperature compartment volume (ft³)) with compartment volumes measured in accordance with the Association of Home Appliance Manufacturers Standard HRF1-1979.

(2) The term “V” means the chilled or frozen compartment volume (ft³) (as defined in the Association of Home Appliance Manufacturers Standard HRF1-1979).

(3) The term “TDA” means the total display area (ft²) of the case, as defined

in the ARI Standard 1200-2006, appendix D (incorporated by reference, see § 431.63).

(b) Each commercial refrigerator, freezer, and refrigerator-freezer with a self-contained condensing unit designed for holding temperature applications manufactured on or after January 1, 2010, shall have a daily energy consumption (in kilowatt hours per day) that does not exceed the following:

Category	Maximum daily energy consumption (kilowatt hours per day)
Refrigerators with solid doors	0.10V + 2.04.
Refrigerators with transparent doors.	0.12V + 3.34.
Freezers with solid doors	0.40V + 1.38.
Freezers with transparent doors.	0.75V + 4.10.
Refrigerator/freezers with solid doors.	the greater of 0.27AV–0.71 or 0.70.

(c) Each commercial refrigerator with a self-contained condensing unit designed for pull-down temperature applications and transparent doors manufactured on or after January 1, 2010, shall have a daily energy consumption (in kilowatt hours per day) of not more than 0.126V + 3.51.

(d) Each commercial refrigerator, freezer, and refrigerator-freezer with a self-contained condensing unit and without doors; commercial refrigerator, freezer, and refrigerator-freezer with a remote condensing unit; and commercial ice-cream freezer manufactured on or after January 1, 2012, shall have a daily energy consumption (in kilowatt hours per day) that does not exceed the levels specified:

(1) For equipment other than hybrid equipment, refrigerator-freezers or wedge cases:

Equipment category	Condensing unit configuration	Equipment family	Rating temp. (°F)	Operating temp. (°F)	Equipment class designation *	Maximum daily energy consumption (kWh/day)
Remote Condensing Commercial Refrigerators and Commercial Freezers.	Remote (RC)	Vertical Open (VOP).	38 (M) 0 (L)	≥32 <32	VOP.RC.M	0.82 × TDA + 4.07
					VOP.RC.L	2.27 × TDA + 6.85
		Semivertical Open (SVO).	38 (M) 0 (L)	≥32 <32	SVO.RC.M	0.83 × TDA + 3.18
					SVO.RC.L	2.27 × TDA + 6.85
		Horizontal Open (HZO).	38 (M) 0 (L)	≥32 <32	HZO.RC.M	0.35 × TDA + 2.88
					HZO.RC.L	0.57 × TDA + 6.88
		Vertical Closed Transparent (VCT).	38 (M) 0 (L)	≥32 <32	VCT.RC.M	0.22 × TDA + 1.95
					VCT.RC.L	0.56 × TDA + 2.61

Equipment category	Condensing unit configuration	Equipment family	Rating temp. (°F)	Operating temp. (°F)	Equipment class designation *	Maximum daily energy consumption (kWh/day)
Self-Contained Commercial Refrigerators and Commercial Freezers without Doors.	Self-Contained (SC).	Horizontal Closed Transparent (HCT).	38 (M) 0 (L)	≥32 <32	HCT.RC.M HCT.RC.L	0.16 × TDA + 0.13 0.34 × TDA + 0.26
		Vertical Closed Solid (VCS).	38 (M) 0 (L)	≥32 <32	VCS.RC.M VCS.RC.L	0.11 × V + 0.26 0.23 × V + 0.54
		Horizontal Closed Solid (HCS).	38 (M) 0 (L)	≥32 <32	HCS.RC.M HCS.RC.L	0.11 × V + 0.26 0.23 × V + 0.54
		Service Over Counter (SOC).	38 (M) 0 (L)	≥32 <32	SOC.RC.M SOC.RC.L	0.51 × TDA + 0.11 1.08 × TDA + 0.22
		Vertical Open (VOP).	38 (M) 0 (L)	≥32 <32	VOP.SC.M VOP.SC.L	1.74 × TDA + 4.71 4.37 × TDA + 11.82
		Semivertical Open (SVO).	38 (M) 0 (L)	≥32 <32	SVO.SC.M SVO.SC.L	1.73 × TDA + 4.59 4.34 × TDA + 11.51
		Horizontal Open (HZO).	38 (M) 0 (L)	≥32 <32	HZO.SC.M HZO.SC.L	0.77 × TDA + 5.55 1.92 × TDA + 7.08
		Vertical Open (VOP).	– 15 (I)	≤ – 5 **	VOP.RC.I	2.89 × TDA + 8.7
		Semivertical Open (SVO).			SVO.RC.I	2.89 × TDA + 8.7
		Horizontal Open (HZO).			HZO.RC.I	0.72 × TDA + 8.74
Commercial Ice-Cream Freezers.	Remote (RC)	Vertical Closed Transparent (VCT).			VCT.RC.I	0.66 × TDA + 3.05
		Horizontal Closed Transparent (HCT).			HCT.RC.I	0.4 × TDA + 0.31
		Vertical Closed Solid (VCS).			VCS.RC.I	0.27 × V + 0.63
		Horizontal Closed Solid (HCS).			HCS.RC.I	0.27 × V + 0.63
		Service Over Counter (SVO).			SOC.RC.I	1.26 × TDA + 0.26
		Vertical Open (VOP).			VOP.SC.I	5.55 × TDA + 15.02
		Semivertical Open (SVO).			SVO.SC.I	5.52 × TDA + 14.63
		Horizontal Open (HZO).			HZO.SC.I	2.44 × TDA + 9
		Vertical Closed Transparent (VCT).			VCT.SC.I	0.67 × TDA + 3.29
		Horizontal Closed Transparent (HCT).			HCT.SC.I	0.56 × TDA + 0.43
		Vertical Closed Solid (VCS).			VCS.SC.I	0.38 × V + 0.88
		Horizontal Closed Solid (HCS).			HCS.SC.I	0.38 × V + 0.88
		Service Over Counter (SVO).			SOC.SC.I	1.76 × TDA + 0.36
	Self-Contained (SC).	Vertical Open (VOP).			VOP.SC.I	5.55 × TDA + 15.02
		Semivertical Open (SVO).			SVO.SC.I	5.52 × TDA + 14.63
		Horizontal Open (HZO).			HZO.SC.I	2.44 × TDA + 9
		Vertical Closed Transparent (VCT).			VCT.SC.I	0.67 × TDA + 3.29
		Horizontal Closed Transparent (HCT).			HCT.SC.I	0.56 × TDA + 0.43
		Vertical Closed Solid (VCS).			VCS.SC.I	0.38 × V + 0.88
		Horizontal Closed Solid (HCS).			HCS.SC.I	0.38 × V + 0.88
		Service Over Counter (SVO).			SOC.SC.I	1.76 × TDA + 0.36

* The meaning of the letters in this column is indicated in the three columns to the left.

** Ice-cream freezer is defined in 10 CFR 431.62 as a commercial freezer that is designed to operate at or below – 5 °F (– 21 °C) and that the manufacturer designs, markets, or intends for the storing, displaying, or dispensing of ice cream.

(2) For commercial refrigeration equipment with two or more compartments (*i.e.*, hybrid refrigerators, hybrid freezers, hybrid refrigerator-freezers, and non-hybrid refrigerator-freezers), the maximum daily energy consumption (MDEC) for each model shall be the sum of the MDEC values for all of

its compartments. For each compartment, measure the TDA or volume of that compartment, and determine the appropriate equipment class based on that compartment's equipment family, condensing unit configuration, and designed operating temperature. The MDEC limit for each compartment

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shall be the calculated value obtained by entering that compartment's TDA or volume into the standard equation in paragraph (d)(1) of this section for that compartment's equipment class. Measure the calculated daily energy consumption (CDEC) or total daily energy consumption (TDEC) for the entire case:

(i) For remote condensing commercial hybrid refrigerators, hybrid freezers, hybrid refrigerator-freezers, and non-hybrid refrigerator-freezers, where two or more independent condensing units each separately cool only one compartment, measure the total refrigeration load of each compartment separately according to the ARI Standard 1200-2006 test procedure (incorporated by reference, see § 431.63). Calculate compressor energy consumption (CEC) for each compartment using Table 1 in ARI Standard 1200-2006 using the saturated evaporator temperature for that compartment. The CDEC for the entire case shall be the sum of the CEC for each compartment, fan energy consumption (FEC), lighting energy consumption (LEC), anti-condensate energy consumption (AEC), defrost energy consumption (DEC), and condensate evaporator pan energy consumption (PEC) (as measured in ARI Standard 1200-2006).

(ii) For remote condensing commercial hybrid refrigerators, hybrid freezers, hybrid refrigerator-freezers, and non-hybrid refrigerator-freezers, where two or more compartments are cooled collectively by one condensing unit, measure the total refrigeration load of the entire case according to the ARI Standard 1200-2006 test procedure (incorporated by reference, see § 431.63). Calculate a weighted saturated evaporator temperature for the entire case by:

(A) Multiplying the saturated evaporator temperature of each compartment by the volume of that compartment (as measured in ARI Standard 1200-2006),

(B) Summing the resulting values for all compartments, and

(C) Dividing the resulting total by the total volume of all compartments.

Calculate the CEC for the entire case using Table 1 in ARI Standard 1200-2006 (incorporated by reference, see § 431.63),

using the total refrigeration load and the weighted average saturated evaporator temperature. The CDEC for the entire case shall be the sum of the CEC, FEC, LEC, AEC, DEC, and PEC.

(iii) For self-contained commercial hybrid refrigerators, hybrid freezers, hybrid refrigerator-freezers, and non-hybrid refrigerator-freezers, measure the TDEC for the entire case according to the ARI Standard 1200-2006 test procedure (incorporated by reference, see § 431.63).

(3) For remote-condensing and self-contained wedge cases, measure the CDEC or TDEC according to the ARI Standard 1200-2006 test procedure (incorporated by reference, see § 431.63). The MDEC for each model shall be the amount derived by incorporating into the standards equation in paragraph (d)(1) of this section for the appropriate equipment class a value for the TDA that is the product of:

(i) The vertical height of the air-curtain (or glass in a transparent door) and (ii) The largest overall width of the case, when viewed from the front.

[70 FR 60414, Oct. 18, 2005, as amended at 74 FR 1140, Jan. 9, 2009]

Subpart D—Commercial Warm Air Furnaces

SOURCE: 69 FR 61939, Oct. 21, 2004, unless otherwise noted.

§ 431.71 Purpose and scope.

This subpart contains energy conservation requirements for commercial warm air furnaces, pursuant to Part C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311-6317.

[69 FR 61939, Oct. 21, 2004, as amended at 70 FR 60415, Oct. 18, 2005]

§ 431.72 Definitions concerning commercial warm air furnaces.

The following definitions apply for purposes of this subpart D, and of subparts J through M of this part. Any words or terms not defined in this Section or elsewhere in this part shall be defined as provided in Section 340 of the Act.

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Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Commercial warm air furnace means a warm air furnace that is industrial equipment, and that has a capacity (rated maximum input) of 225,000 Btu per hour or more.

Thermal efficiency for a commercial warm air furnace equals 100 percent minus percent flue loss determined using test procedures prescribed under § 431.76.

Warm air furnace means a self-contained oil-fired or gas-fired furnace designed to supply heated air through ducts to spaces that require it and includes combination warm air furnace/electric air conditioning units but does not include unit heaters and duct furnaces.

[69 FR 61939, Oct. 21, 2004, as amended at 76 FR 12503, Mar. 7, 2011]

TEST PROCEDURES

§ 431.75 Materials incorporated by reference.

(a) *General.* DOE incorporates by reference the following test procedures into subpart D of part 431. The materials listed have been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to the listed materials by the standard-setting organization will not affect the DOE regulations unless and until such regulations are amended by DOE. Materials are incorporated as they exist on the date of the approval, and a notice of any changes in the materials will be published in the FEDERAL REGISTER. All approved materials are available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030 or go to: http://www.archives.gov/federal_register/code_of_federalregulations/

[ibr_locations.html](#). Also, these materials are available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza SW., Washington, DC 20024, (202) 586-2945, or go to: http://www1.eere.energy.gov/buildings/appliance_standards/. The referenced test procedure standards are listed below by relevant standard-setting organization, along with information on how to obtain copies from those sources.

(b) *ANSI.* American National Standards Institute. 25 W. 43rd Street, 4th Floor, New York, NY 10036, (212) 642-4900, or go to: <http://www.ansi.org>.

(1) ANSI Z21.47-1998, (“ANSI Z21.47-1998”), “Gas-Fired Central Furnaces,” approved by ANSI on June 9, 1998, IBR approved for § 431.76.

(2) ANSI Z21.47-2006, (“ANSI Z21.47-2006”), “Gas-Fired Central Furnaces,” approved on July 27, 2006, IBR approved for § 431.76.

(3) Reserved.

(c) *ASHRAE.* American Society of Heating, Refrigerating and Air-Conditioning Engineers Inc., 1791 Tullie Circle, NE., Atlanta, Georgia 30329, (404) 636-8400, or go to: <http://www.ashrae.org>.

(1) ASHRAE Standard 103-1993, sections 7.2.2.4, 7.8, 9.2, and 11.3.7, “Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers,” approved on June 26, 1993, IBR approved for § 431.76.

(2) [Reserved].

(d) *HI.* Hydronics Institute Division of AHRI, 35 Russo Place, P.O. Box 218, Berkeley Heights, NJ 07922, (703) 600-0350, or go to: <http://www.ahrinet.org/hydronics+institute+section.aspx>.

(1) HI BTS-2000, sections 8.2.2, 11.1.4, 11.1.5, and 11.1.6.2, “Method to Determine Efficiency of Commercial Space Heating Boilers,” published January 2001, IBR approved for § 431.76.

(2) [Reserved].

(e) *UL.* Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062, (847) 272-8800, or go to: <http://www.ul.com>.

(1) UL 727 (UL 727-1994), “Standard for Safety Oil-Fired Central Furnaces,” published on August 1, 1994, IBR approved for § 431.76.

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(2) UL 727 (UL 727–2006), “*Standard for Safety Oil-Fired Central Furnaces*,” approved April 7, 2006, IBR approved for §431.76.

(3) [Reserved].

[77 FR 28987, May 16, 2012]

§431.76 Uniform test method for the measurement of energy efficiency of commercial warm air furnaces.

(a) This section covers the test procedures you must follow if, pursuant to EPCA, you are measuring the steady-state thermal efficiency of a gas-fired or oil-fired commercial warm air furnace with a rated maximum input of 225,000 Btu per hour or more. Where this section prescribes use of ANSI Z21.47 or UL 727, (incorporated by reference, see §431.75), perform only the procedures pertinent to the measurement of the steady-state efficiency. Before May 13, 2013, where you see instructions to use ANSI Z21.47–2006 or UL 727–2006 in this section, you may use the relevant procedures in ANSI Z21.47–1998 or UL 727–1994. On or after May 13, 2013, you must use the relevant procedures in ANSI Z21.47–2006 or UL 727–2006.

(b) *Test setup*—(1) *Test setup for gas-fired commercial warm air furnaces*. The test setup, including flue requirement, instrumentation, test conditions, and measurements for determining thermal efficiency is as specified in sections 1.1 (Scope), 2.1 (General), 2.2 (Basic Test Arrangements), 2.3 (Test Ducts and Plenums), 2.4 (Test Gases), 2.5 (Test Pressures and Burner Adjustments), 2.6 (Static Pressure and Air Flow Adjustments), 2.39 (Thermal Efficiency) (note, this is 2.38 in ANSI Z21.47–1998 (incorporated by reference, see §431.75)), and 4.2.1 (Basic Test Arrangements for Direct Vent Control Furnaces) of ANSI Z21.47–2006 (incorporated by reference, see §431.75). The thermal efficiency test must be conducted only at the normal inlet test pressure, as specified in section 2.5.1 of ANSI Z21.47–2006, and at the maximum hourly Btu input rating specified by the manufacturer for the product being tested.

(2) *Test setup for oil-fired commercial warm air furnaces*. The test setup, including flue requirement, instrumentation, test conditions, and measurement for measuring thermal efficiency is as

specified in sections 1 (Scope), 2 (Units of Measurement), 3 (Glossary), 37 (General), 38 and 39 (Test Installation), 40 (Instrumentation, except 40.4 and 40.6.2 through 40.6.7, which are not required for the thermal efficiency test), 41 (Initial Test Conditions), 42 (Combustion Test—Burner and Furnace), 43.2 (Operation Tests), 44 (Limit Control Cutout Test), 45 (Continuity of Operation Test), and 46 (Air Flow, Downflow or Horizontal Furnace Test), of UL 727–2006 (incorporated by reference, see §431.75). You must conduct a fuel oil analysis for heating value, hydrogen content, carbon content, pounds per gallon, and American Petroleum Institute (API) gravity as specified in section 8.2.2 of HI BTS–2000 (incorporated by reference, see §431.75). The steady-state combustion conditions, specified in Section 42.1 of UL 727–2006, are attained when variations of not more than 5 °F in the measured flue gas temperature occur for three consecutive readings taken 15 minutes apart.

(c) *Additional test measurements*—(1) *Measurement of flue CO₂ (carbon dioxide) for oil-fired commercial warm air furnaces*. In addition to the flue temperature measurement specified in section 40.6.8 of UL 727–2006, (incorporated by reference, see §431.75) you must locate one or two sampling tubes within six inches downstream from the flue temperature probe (as indicated on Figure 40.3 of UL 727–2006). If you use an open end tube, it must project into the flue one-third of the chimney connector diameter. If you use other methods of sampling CO₂, you must place the sampling tube so as to obtain an average sample. There must be no air leak between the temperature probe and the sampling tube location. You must collect the flue gas sample at the same time the flue gas temperature is recorded. The CO₂ concentration of the flue gas must be as specified by the manufacturer for the product being tested, with a tolerance of ±0.1 percent. You must determine the flue CO₂ using an instrument with a reading error no greater than ±0.1 percent.

(2) *Procedure for the measurement of condensate for a gas-fired condensing commercial warm air furnace*. The test procedure for the measurement of the condensate from the flue gas under

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steady state operation must be conducted as specified in sections 7.2.2.4, 7.8, and 9.2 of ASHRAE Standard 103-1993 (incorporated by reference, see § 431.75) under the maximum rated input conditions. You must conduct this condensate measurement for an additional 30 minutes of steady state operation after completion of the steady state thermal efficiency test specified in paragraph (b) of this section.

(d) *Calculation of thermal efficiency—*

(1) *Gas-fired commercial warm air furnaces.* You must use the calculation procedure specified in section 2.39, Thermal Efficiency, of ANSI Z21.47-2006 (incorporated by reference, see § 431.75). (Note, this is section 2.38 in ANSI Z21.47-1998 (incorporated by reference, see § 431.75))

(2) *Oil-fired commercial warm air furnaces.* You must calculate the percent flue loss (in percent of heat input rate) by following the procedure specified in sections 11.1.4, 11.1.5, and 11.1.6.2 of the HI BTS-2000 (incorporated by reference, see § 431.75). The thermal efficiency must be calculated as:

Thermal Efficiency (percent) = 100 percent - flue loss (in percent).

(e) *Procedure for the calculation of the additional heat gain and heat loss, and adjustment to the thermal efficiency, for a condensing commercial warm air furnace.*

(1) You must calculate the latent heat gain from the condensation of the water vapor in the flue gas, and calculate heat loss due to the flue condensate down the drain, as specified in sections 11.3.7.1 and 11.3.7.2 of ASHRAE Standard 103-1993, (incorporated by reference, see § 431.75), with the exception that in the equation for the heat loss due to hot condensate flowing down the drain in section 11.3.7.2, the assumed indoor temperature of 70 °F and the temperature term T_{OA} must be replaced by the measured room temperature as specified in section 2.2.8 of ANSI Z21.47-2006 (incorporated by reference, see § 431.75).

(2) *Adjustment to the Thermal Efficiency for Condensing Furnace.* You must adjust the thermal efficiency as calculated in paragraph (d)(1) of this section by adding the latent gain, expressed in percent, from the condensation of the water vapor in the flue gas,

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and subtracting the heat loss (due to the flue condensate down the drain), also expressed in percent, both as calculated in paragraph (e)(1) of this section, to obtain the thermal efficiency of a condensing furnace.

[77 FR 28987, May 16, 2012]

ENERGY CONSERVATION STANDARDS

§ 431.77 Energy conservation standards and their effective dates.

Each commercial warm air furnace manufactured on or after January 1, 1994, must meet the following energy efficiency standard levels:

(a) For a gas-fired commercial warm air furnace with capacity of 225,000 Btu per hour or more, the thermal efficiency at the maximum rated capacity (rated maximum input) must be not less than 80 percent.

(b) For an oil-fired commercial warm air furnace with capacity of 225,000 Btu per hour or more, the thermal efficiency at the maximum rated capacity (rated maximum input) must be not less than 81 percent.

Subpart E—Commercial Packaged Boilers

SOURCE: 69 FR 61960, Oct. 21, 2004, unless otherwise noted.

§ 431.81 Purpose and scope.

This subpart contains energy conservation requirements for certain commercial packaged boilers, pursuant to Part C of Title III of the Energy Policy and Conservation Act. (42 U.S.C. 6311-6317)

[69 FR 61960, Oct. 21, 2004, as amended at 70 FR 60415, Oct. 18, 2005]

§ 431.82 Definitions concerning commercial packaged boilers.

The following definitions apply for purposes of this subpart E, and of subparts A and J through M of this part. Any words or terms not defined in this section or elsewhere in this part shall be defined as provided in 42 U.S.C. 6311.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially

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identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Btu/h or *Btu/hr* means British thermal units per hour.

Combustion efficiency for a commercial packaged boiler is determined using test procedures prescribed under § 431.86 and is equal to 100 percent minus percent flue loss (percent flue loss is based on input fuel energy).

Commercial packaged boiler means a type of packaged low pressure boiler that is industrial equipment with a capacity, (rated maximum input) of 300,000 Btu per hour (Btu/hr) or more which, to any significant extent, is distributed in commerce:

(1) For heating or space conditioning applications in buildings; or

(2) For service water heating in buildings but does not meet the definition of “hot water supply boiler” in this part.

Condensing boiler means a commercial packaged boiler that condenses part of the water vapor in the flue gases, and that includes a means of collecting and draining this condensate from its heat exchanger section.

Flue condensate means liquid formed by the condensation of moisture in the flue gases.

Manufacturer of a commercial packaged boiler means any person who manufactures, produces, assembles or imports such a boiler, including any person who:

(1) Manufactures, produces, assembles or imports a commercial packaged boiler in its entirety;

(2) Manufactures, produces, assembles or imports a commercial packaged boiler in part, and specifies or approves the boiler's components, including burners or other components produced by others, as for example by specifying such components in a catalogue by make and model number or parts number; or

(3) Is any vendor or installer who sells a commercial packaged boiler that consists of a combination of components that is not specified or approved by a person described in paragraph (1) or (2) of this definition.

Packaged boiler means a boiler that is shipped complete with heating equipment, mechanical draft equipment and automatic controls; usually shipped in one or more sections and does not include a boiler that is custom designed and field constructed. If the boiler is shipped in more than one section, the sections may be produced by more than one manufacturer, and may be originated or shipped at different times and from more than one location.

Packaged high pressure boiler means a packaged boiler that is:

(1) A steam boiler designed to operate at a steam pressure higher than 15 psi gauge (psig); or

(2) A hot water boiler designed to operate at a water pressure above 160 psig or at a water temperature exceeding 250 °F, or both; or

(3) A boiler that is designed to be capable of supplying either steam or hot water, and designed to operate under the conditions in paragraphs (1) and (2) of this definition.

Packaged low pressure boiler means a packaged boiler that is:

(1) A steam boiler designed to operate at or below a steam pressure of 15 psig; or

(2) A hot water boiler designed to operate at or below a water pressure of 160 psig and a temperature of 250 °F; or

(3) A boiler that is designed to be capable of supplying either steam or hot water, and designed to operate under the conditions in paragraphs (1) and (2) of this definition.

Thermal efficiency for a commercial packaged boiler is determined using test procedures prescribed under § 431.86 and is the ratio of the heat absorbed by the water or the water and steam to the higher heating value in the fuel burned.

[69 FR 61960, Oct. 21, 2004, as amended at 74 FR 36354, July 22, 2009; 76 FR 12503, Mar. 7, 2011]

TEST PROCEDURES

§ 431.85 Materials incorporated by reference.

(a) *General.* We incorporate by reference the following standards into subpart E of part 431. The material listed has been approved for incorporation by reference by the Director of the

Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to a standard by the standard-setting organization will not affect the DOE regulations unless and until amended by DOE. Material is incorporated as it exists on the date of the approval and a notice of any change in the material will be published in the FEDERAL REGISTER. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030 or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. Also, this material is available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, 202-586-2945, or go to: http://www1.eere.energy.gov/buildings/appliance_standards/. Standards can be obtained from the sources listed below.

(b) *HI*. The Gas Appliance Manufacturers Association (GAMA) merged in 2008 with the Air-Conditioning and Refrigeration Institute to become the Air-Conditioning, Heating, and Refrigeration Institute (AHRI). The Hydronics Institute BTS-2000 Testing Standard can be obtained from AHRI. For information on how to obtain this material, contact the Hydronics Institute Section of AHRI, P.O. Box 218, Berkeley Heights, NJ 07922-0218, (866) 408-3831, or go to: http://www.ahrinet.org/Content/OrderaStandard_573.aspx.

(1) The Hydronics Institute Division of GAMA BTS-2000 Testing Standard, ("HI BTS-2000, Rev 06.07"), *Method to Determine Efficiency of Commercial Space Heating Boilers*, Second Edition (Rev 06.07), 2007, IBR approved for § 431.86.

(2) [Reserved]

[74 FR 36354, July 22, 2009]

§ 431.86 Uniform test method for the measurement of energy efficiency of commercial packaged boilers.

(a) *Scope*. This section provides test procedures that must be followed for measuring, pursuant to EPCA, the steady state combustion efficiency and

thermal efficiency of a gas-fired or oil-fired commercial packaged boiler. These test procedures apply to packaged low pressure boilers that have rated input capacities of 300,000 Btu/h or more and are "commercial packaged boilers," but do not apply under EPCA to "packaged high pressure boilers."

(b) *Definitions*. For purposes of this section, the Department incorporates by reference the definitions specified in Section 3.0 of the HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85), with the exception of the definition for the terms "packaged boiler," "condensing boilers," and "packaged low pressure steam" and "hot water boiler."

(c) *Test Method for Commercial Packaged Boilers—General*. Follow the provisions in this paragraph (c) for all testing of packaged low pressure boilers that are commercial packaged boilers.

(1) *Test Setup*—(i) *Classifications*: If employing boiler classification, you must classify boilers as given in Section 4.0 of the HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85).

(ii) *Requirements*: (A) Before March 2, 2012, conduct the combustion efficiency test as given in Section 5.2 (Combustion Efficiency Test) of the HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85) for all commercial packaged boiler equipment classes.

(B) On or after March 2, 2012, conduct the thermal efficiency test as given in Section 5.1 (Thermal Efficiency Test) of the HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85) for the following commercial packaged boiler equipment classes: Small, gas, hot water; small, gas, steam, all except natural draft; small, gas, steam, natural draft; small, oil, hot water; small, oil, steam; large, gas, steam, all except natural draft; large, gas, steam, natural draft; and large, oil, steam. On or after March 2, 2012, conduct the combustion efficiency test as given in Section 5.2 (Combustion Efficiency Test) of the HI BTS-2000, Rev 06.07 for the following commercial packaged boiler equipment classes: Large, gas-fired, hot water and large, oil-fired, hot water.

(iii) *Instruments and Apparatus*: (A) Follow the requirements for instruments and apparatus in sections 6 (Instruments) and 7 (Apparatus), of the HI

BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85), with the exception of section 7.2.5 (flue connection for outdoor boilers) which is replaced with paragraph (c)(1)(iii)(B) of this section:

(B) *Flue Connection for Outdoor Boilers*: Consistent with the procedure specified in section 7.2.1 of HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85), the integral venting used in oil-fired and power gas outdoor boilers may be modified only to the extent necessary to permit the boiler's connection to the test flue apparatus for testing.

(iv) *Test Conditions*: Use test conditions from Section 8.0 (excluding 8.6.2) of HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85) for combustion efficiency testing. Use all of the test conditions from Section 8.0 of HI BTS-2000, Rev 06.07 for thermal efficiency testing.

(2) *Test Measurements*—(i) *Non-Condensing Boilers*: (A) *Combustion Efficiency*. Measure for combustion efficiency according to sections 9.1 (excluding sections 9.1.1.2.3 and 9.1.2.2.3), 9.2 and 10.2 of the HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85).

(B) *Thermal Efficiency*. Measure for thermal efficiency according to sections 9.1 and 10.1 of the HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85).

(ii) *Procedure for the Measurement of Condensate for a Condensing Boiler*. For the combustion efficiency test, collect flue condensate as specified in Section 9.2.2 of HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85). Measure the condensate from the flue gas under steady state operation for the 30 minute collection period during the 30 minute steady state combustion efficiency test. Flue condensate mass shall be measured immediately at the end of the 30 minute collection period to prevent evaporation loss from the sample. The humidity of the room shall at no time exceed 80 percent. Determine the mass of flue condensate for the steady state period by subtracting the tare container weight from the total container and flue condensate weight measured at the end of the test period. For the thermal efficiency test, collect and measure the condensate

from the flue gas as specified in Section 9.1.1 and 9.1.2 of HI BTS-2000, Rev 06.07.

(iii) *A Boiler That is Capable of Supplying Either Steam or Hot Water*—(A) *Testing*. For purposes of EPCA, before March 2, 2012, measure the combustion efficiency of any size commercial packaged boiler capable of supplying either steam or hot water either by testing the boiler in the steam mode or by testing it in both the steam and hot water modes. On or after March 2, 2012, measure the combustion efficiency and thermal efficiency of a large (fuel input greater than 2,500 kBtu/h) commercial packaged boiler capable of supplying either steam or hot water either by testing the boiler for both efficiencies in steam mode, or by testing the boiler in both steam and hot water modes measuring the thermal efficiency of the boiler in steam mode and the combustion efficiency of the boiler in hot water mode. Measure only the thermal efficiency of a small (fuel input of greater than or equal to 300 kBtu/h and less than or equal to 2,500 kBtu/h) commercial packaged boiler capable of supplying either steam or hot water either by testing the boiler for thermal efficiency only in steam mode or by testing the boiler for thermal efficiency in both steam and hot water modes.

(B) *Rating*. If testing a large boiler only in the steam mode, use the efficiencies determined from such testing to rate the thermal efficiency for the steam mode and the combustion efficiency for the hot water mode. If testing a large boiler in both modes, rate the boiler's efficiency for each mode based on the testing in that mode. If testing a small boiler only in the steam mode, use the efficiencies determined from such testing to rate the thermal efficiency for the steam mode and the hot water mode. If testing a small boiler in both modes, rate the boiler's efficiency for each mode based on the testing in that mode.

(3) *Calculation of Efficiency*—(i) *Combustion Efficiency*. Use the calculation procedure for the combustion efficiency test specified in Section 11.2 (including the specified subsections of 11.1) of the HI BTS-2000, Rev 06.07 (incorporated by reference, see § 431.85).

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(ii) *Thermal Efficiency.* Use the calculation procedure for the thermal efficiency test specified in Section 11.1 of the HI BTS–2000, Rev 06.07 (incorporated by reference, *see* § 431.85).

[74 FR 36354, July 22, 2009]

ENERGY EFFICIENCY STANDARDS

§ 431.87 Energy conservation standards and their effective dates.

(a) Each commercial packaged boiler manufactured on or after January 1, 1994, and before March 2, 2012, must meet the following energy efficiency standard levels:

(1) For a gas-fired packaged boiler with a capacity (rated maximum input)

of 300,000 Btu/h or more, the combustion efficiency at the maximum rated capacity must be not less than 80 percent.

(2) For an oil-fired packaged boiler with a capacity (rated maximum input) of 300,000 Btu/h or more, the combustion efficiency at the maximum rated capacity must be not less than 83 percent.

(b) Each commercial packaged boiler listed in Table 1 to § 431.87 and manufactured on or after the effective date listed in Table 1 of this section, must meet the applicable energy conservation standard in Table 1.

TABLE 1 TO § 431.87—COMMERCIAL PACKAGED BOILER ENERGY CONSERVATION STANDARDS

Equipment type	Subcategory	Size category (input)	Efficiency level—Effective date: March 2, 2012 *
Hot Water Commercial Packaged Boilers ...	Gas-fired	≥300,000 Btu/h and ≤2,500,000 Btu/h.	80.0% E _T
Hot Water Commercial Packaged Boilers ...	Gas-fired	>2,500,000 Btu/h	82.0% E _C
Hot Water Commercial Packaged Boilers ...	Oil-fired	≥300,000 Btu/h and ≤2,500,000 Btu/h.	82.0% E _T
Hot Water Commercial Packaged Boilers ...	Oil-fired	>2,500,000 Btu/h	84.0% E _C
Steam Commercial Packaged Boilers	Gas-fired—all, except natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h.	79.0% E _T
Steam Commercial Packaged Boilers	Gas-fired—all, except natural draft	>2,500,000 Btu/h	79.0% E _T
Steam Commercial Packaged Boilers	Gas-fired—natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h.	77.0% E _T
Steam Commercial Packaged Boilers	Gas-fired—natural draft	>2,500,000 Btu/h	77.0% E _T
Steam Commercial Packaged Boilers	Oil-fired	≥300,000 Btu/h and ≤2,500,000 Btu/h.	81.0% E _T
Steam Commercial Packaged Boilers	Oil-fired	>2,500,000 Btu/h	81.0% E _T

*Where E_C is combustion efficiency and E_T is thermal efficiency as defined in § 431.82.

(c) Each commercial packaged boiler listed in Table 2 to § 431.87 and manufactured on or after the effective date

listed in Table 2 of this section, must meet the applicable energy conservation standard in Table 2.

TABLE 2 TO § 431.87—COMMERCIAL PACKAGED BOILER ENERGY CONSERVATION STANDARDS

Equipment type	Subcategory	Size category (input)	Efficiency level—Effective date: March 2, 2022 *
Steam Commercial Packaged Boilers ...	Gas-fired—natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h	79.0% E _T
Steam Commercial Packaged Boilers ...	Gas-fired—natural draft	>2,500,000 Btu/h	79.0% E _T

*Where E_C is combustion efficiency and E_T is thermal efficiency as defined in § 431.82.

[74 FR 36355, July 22, 2009]

Subpart F—Commercial Air Conditioners and Heat Pumps

SOURCE: 69 FR 61969, Oct. 21, 2004, unless otherwise noted.

§ 431.91 Purpose and scope.

This subpart specifies test procedures and energy conservation standards for certain commercial air conditioners and heat pumps, pursuant to Part C of

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Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311–6317.

[69 FR 61969, Oct. 21, 2004, as amended at 70 FR 60415, Oct. 18, 2005]

§ 431.92 Definitions concerning commercial air conditioners and heat pumps.

The following definitions apply for purposes of this subpart F, and of subparts J through M of this part. Any words or terms not defined in this section or elsewhere in this part shall be defined as provided in 42 U.S.C. 6311.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Coefficient of Performance, or COP means the ratio of the produced cooling effect of an air conditioner or heat pump (or its produced heating effect, depending on the mode of operation) to its net work input, when both the cooling (or heating) effect and the net work input are expressed in identical units of measurement.

Commercial package air-conditioning and heating equipment means air-cooled, water-cooled, evaporatively-cooled, or water source (not including ground water source) electrically operated, unitary central air conditioners and central air-conditioning heat pumps for commercial application.

Computer Room Air Conditioner means a basic model of commercial package air-conditioning and heating equipment (packaged or split) that is: Used in computer rooms, data processing rooms, or other information technology cooling applications; rated for sensible coefficient of performance (SCOP) and tested in accordance with 10 CFR 431.96, and is not a covered consumer product under 42 U.S.C. 6291(1)–(2) and 6292. A computer room air conditioner may be provided with, or have as available options, an integrated humidifier, temperature, and/or humidity control of the supplied air, and reheating function.

Energy Efficiency Ratio, or EER means the ratio of the produced cooling effect of an air conditioner or heat pump to its net work input, expressed in Btu/watt-hour.

Heat Recovery (in the context of variable refrigerant flow multi-split air conditioners or variable refrigerant flow multi-split heat pumps) means that the air conditioner or heat pump is also capable of providing simultaneous heating and cooling operation, where recovered energy from the indoor units operating in one mode can be transferred to one or more other indoor units operating in the other mode. A variable refrigerant flow multi-split heat recovery heat pump is a variable refrigerant flow multi-split heat pump with the addition of heat recovery capability.

Heating seasonal performance factor, or HSPF means the total heating output of a central air-conditioning heat pump during its normal annual usage period for heating, expressed in Btu's and divided by the total electric power input, expressed in watt-hours, during the same period.

Large commercial package air-conditioning and heating equipment means commercial package air-conditioning and heating equipment that is rated—

- (1) At or above 135,000 Btu per hour; and
- (2) Below 240,000 Btu per hour (cooling capacity).

Non-standard size means a packaged terminal air conditioner or packaged terminal heat pump with existing wall sleeve dimensions having an external wall opening of less than 16 inches high or less than 42 inches wide, and a cross-sectional area less than 670 square inches.

Packaged terminal air conditioner means a wall sleeve and a separate unencased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall, and that is industrial equipment. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder's choice of hot water, steam, or electricity.

Packaged terminal heat pump means a packaged terminal air conditioner that utilizes reverse cycle refrigeration as

its prime heat source, that has a supplementary heat source available, with the choice of hot water, steam, or electric resistant heat, and that is industrial equipment.

Seasonal energy efficiency ratio or SEER means the total cooling output of a central air conditioner or central air-conditioning heat pump, expressed in Btu's, during its normal annual usage period for cooling and divided by the total electric power input, expressed in watt-hours, during the same period.

Sensible Coefficient of Performance, or SCOP means the net sensible cooling capacity in watts divided by the total power input in watts (excluding reheaters and humidifiers).

Single package unit means any central air conditioner or central air-conditioning heat pump in which all the major assemblies are enclosed in one cabinet.

Single package vertical air conditioner means air-cooled commercial package air conditioning and heating equipment that—

(1) Is factory-assembled as a single package that—

(i) Has major components that are arranged vertically;

(ii) Is an encased combination of cooling and optional heating components; and

(iii) Is intended for exterior mounting on, adjacent interior to, or through an outside wall;

(2) Is powered by a single-or 3-phase current;

(3) May contain 1 or more separate indoor grilles, outdoor louvers, various ventilation options, indoor free air discharges, ductwork, well plenum, or sleeves; and

(4) Has heating components that may include electrical resistance, steam, hot water, or gas, but may not include reverse cycle refrigeration as a heating means.

Single package vertical heat pump means a single package vertical air conditioner that—

(1) Uses reverse cycle refrigeration as its primary heat source; and

(2) May include secondary supplemental heating by means of electrical resistance, steam, hot water, or gas.

Small commercial package air-conditioning and heating equipment means

commercial package air-conditioning and heating equipment that is rated below 135,000 Btu per hour (cooling capacity).

Split system means any central air conditioner or central air conditioning heat pump in which one or more of the major assemblies are separate from the others.

Standard size means a packaged terminal air conditioner or packaged terminal heat pump with wall sleeve dimensions having an external wall opening of greater than or equal to 16 inches high or greater than or equal to 42 inches wide, and a cross-sectional area greater than or equal to 670 square inches.

Variable Refrigerant Flow Multi-Split Air Conditioner means a unit of commercial package air-conditioning and heating equipment that is configured as a split system air conditioner incorporating a single refrigerant circuit, with one or more outdoor units, at least one variable-speed compressor or an alternate compressor combination for varying the capacity of the system by three or more steps, and multiple indoor fan coil units, each of which is individually metered and individually controlled by an integral control device and common communications network and which can operate independently in response to multiple indoor thermostats. Variable refrigerant flow implies three or more steps of capacity control on common, inter-connecting piping.

Variable Refrigerant Flow Multi-Split Heat Pump means a unit of commercial package air-conditioning and heating equipment that is configured as a split system heat pump that uses reverse cycle refrigeration as its primary heating source and which may include secondary supplemental heating by means of electrical resistance, steam, hot water, or gas. The equipment incorporates a single refrigerant circuit, with one or more outdoor units, at least one variable-speed compressor or an alternate compressor combination for varying the capacity of the system by three or more steps, and multiple indoor fan coil units, each of which is individually metered and individually controlled by a control device and common communications network and

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which can operate independently in response to multiple indoor thermostats. Variable refrigerant flow implies three or more steps of capacity control on common, inter-connecting piping.

Very large commercial package air-conditioning and heating equipment means commercial package air-conditioning and heating equipment that is rated—

(1) At or above 240,000 Btu per hour; and

(2) Below 760,000 Btu per hour (cooling capacity).

[69 FR 61969, Oct. 21, 2004, as amended at 70 FR 60415, Oct. 18, 2005; 73 FR 58828, Oct. 7, 2008; 74 FR 12073, Mar. 23, 2009; 76 FR 12503, Mar. 7, 2011; 77 FR 28988, May 16, 2012]

TEST PROCEDURES

§ 431.95 Materials incorporated by reference.

(a) *General.* DOE incorporates by reference the following test procedures into subpart F of part 431. The materials listed have been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to the listed materials by the standard-setting organization will not affect the DOE regulations unless and until such regulations are amended by DOE. Materials are incorporated as they exist on the date of the approval, and a notice of any changes in the materials will be published in the FEDERAL REGISTER. All approved materials are available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030, or go to: http://www.archives.gov/federal_register/code_of_federalregulations/ibr_locations.html. Also, this material is available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza SW., Washington, DC 20024, (202) 586-2945, or go to: http://www1.eere.energy.gov/buildings/appliance_standards/. The referenced test procedure standards are listed below by relevant standard-setting organization, along with information on

how to obtain copies from those sources.

(b) *AHRI.* Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Blvd., Suite 500, Arlington, VA 22201, (703) 524-8800, or go to: <http://www.ahrinet.org>.

(1) ARI Standard 210/240-2003, “2003 Standard for *Unitary Air-Conditioning & Air-Source Heat Pump Equipment*,” published in 2003 (AHRI 210/240-2003), IBR approved for § 431.96.

(2) ANSI/AHRI Standard 210/240-2008, “2008 Standard for *Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment*,” approved by ANSI on October 27, 2011 and updated by addendum 1 in June 2011 and addendum 2 in March 2012 (AHRI 210/240-2008), IBR approved for § 431.96.

(3) ARI Standard 310/380-2004, “*Standard for Packaged Terminal Air-Conditioners and Heat Pumps*,” published September 2004 (AHRI 310/380-2004), IBR approved for § 431.96.

(4) ARI Standard 340/360-2004, “2004 Standard for *Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment*,” published in 2004 (AHRI 340/360-2004), IBR approved for § 431.96.

(5) ANSI/AHRI Standard 340/360-2007, “2007 Standard for *Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment*,” approved by ANSI on October 27, 2011 and updated by addendum 1 in December 2010 and addendum 2 in June 2011 (AHRI 340/360-2007), IBR approved for § 431.96.

(6) ANSI/AHRI Standard 390-2003, “2003 Standard for *Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps*,” dated 2003, (AHRI 390-2003), IBR approved for § 431.96.

(7) ANSI/AHRI Standard 1230-2010, “2010 Standard for *Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment*,” approved August 2, 2010 and updated by addendum 1 in March 2011 (AHRI 1230-2010), IBR approved for § 431.96.

(8) [Reserved].

(c) *ASHRAE.* American Society of Heating, Refrigerating and Air-Conditioning Engineers, 1791 Tullie Circle,

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NE., Atlanta, Georgia 30329, (404) 636–8400, or go to: <http://www.ashrae.org>.

(1) ASHRAE Standard 127–2007, “*Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners*,” approved on June 28, 2007, (ASHRAE 127–2007), IBR approved for § 431.96.

(2) [Reserved].

(d) ISO. International Organization for Standardization, 1, ch. De la Voie-Creuse, Case Postale 56, CH–1211 Geneva 20, Switzerland, +41 22 749 01 11 or go to: <http://www.iso.ch/>.

(1) ISO Standard 13256–1, “*Water-source heat pumps—Testing and rating for performance—Part 1: Water-to-air and brine-to-air heat pumps*,” approved 1998, IBR approved for § 431.96.

(2) [Reserved].

[77 FR 28989, May 16, 2012]

§ 431.96 Uniform test method for the measurement of energy efficiency of commercial air conditioners and heat pumps.

(a) *Scope*. This section contains test procedures for measuring, pursuant to

EPCA, the energy efficiency of any small, large, or very large commercial package air-conditioning and heating equipment, packaged terminal air conditioners and packaged terminal heat pumps, computer room air conditioners, variable refrigerant flow systems, and single package vertical air conditioners and single package vertical heat pumps.

(b) *Testing and calculations*. (1) Determine the energy efficiency of each covered product by conducting the test procedure(s) listed in the rightmost column of Table 1 of this section, that apply to the energy efficiency descriptor for that product, category, and cooling capacity, until compliance with this test procedure version is no longer required per the date shown in the 5th most column from the left of Table 1 of this section.

TABLE 1 TO § 431.96—TEST PROCEDURES FOR COMMERCIAL AIR CONDITIONERS AND HEAT PUMPS

Equipment type	Category	Cooling capacity	Energy efficiency descriptor	Test procedure required for compliance until	Use tests, conditions, and procedures ¹ in
Small Commercial Packaged Air-Conditioning and Heating Equipment.	Air-Cooled, 3-Phase, AC and HP.	<65,000 Btu/h ≥65,000 Btu/h and <135,000 Btu/h.	SEER and HSPF EER and COP	May 13, 2013 ... May 13, 2013 ...	ARI 210/240–2003. ARI 340/360–2004.
	Air-Cooled AC and HP.				
	Water-Cooled and Evaporatively-Cooled AC.	<65,000 Btu/h ≥65,000 Btu/h and <135,000 Btu/h.	EER EER	May 13, 2013 ... May 13, 2013 ...	ARI 210/240–2003. ARI 340/360–2004.
	Water-Source HP ..	<135,000 Btu/h ...	EER and COP	May 13, 2013 ...	ISO Standard 13256–1 (1998).
Large Commercial Packaged Air-Conditioning and Heating Equipment.	Air-Cooled AC and HP.	≥135,000 Btu/h and <240,000 Btu/h.	EER and COP EER	May 13, 2013 ... May 13, 2013 ...	ARI 340/360–2004. ARI 340/360–2004.
	Water-Cooled and Evaporatively-Cooled AC.	≥135,000 Btu/h and <240,000 Btu/h.			
Very Large Commercial Packaged Air-Conditioning and Heating Equipment.	Air-Cooled AC and HP.	≥240,000 Btu/h and <760,000 Btu/h.	EER and COP EER	May 13, 2013 ... May 13, 2013 ...	ARI 340/360–2004. ARI 340/360–2004.
	Water-Cooled and Evaporatively-Cooled AC.	≥240,000 Btu/h and <760,000 Btu/h.			
Packaged Terminal Air Conditioners and Heat Pumps.	AC and HP	<760,000 Btu/h ...	EER and COP	May 13, 2013 ...	AHRI 310/380–2004.

¹ Incorporated by reference, see § 431.95.

(2) On or after the compliance dates listed in Table 2 of this section, determine the energy efficiency of each type

of covered equipment by conducting the test procedure(s) listed in the rightmost column of Table 2 of this

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section along with any additional testing provisions set forth in paragraphs (c), (d), and (e) of this section, that apply to the energy efficiency descriptor for that equipment, category,

and cooling capacity. Note, the omitted sections of the test procedures listed in the rightmost column of Table 1 of this section shall not be used.

TABLE 2 TO § 431.96—TEST PROCEDURES FOR COMMERCIAL AIR CONDITIONERS AND HEAT PUMPS

Equipment type	Category	Cooling capacity	Energy efficiency descriptor	Compliance with test procedure required on or after	Use tests, conditions, and procedures ¹ in
Small Commercial Packaged Air-Conditioning and Heating Equipment.	Air-Cooled, 3-Phase, AC and HP.	<65,000 Btu/h ≥65,000 Btu/h and <135,000 Btu/h.	SEER and HSPF EER and COP	May 13, 2013 ... May 13, 2013 ...	AHRI 210/240–2008 (omit section 6.5). AHRI 340/360–2007 (omit section 6.3).
	Water-Cooled and Evaporatively-Cooled AC.	<65,000 Btu/h ≥65,000 Btu/h and <135,000 Btu/h.	EER EER	May 13, 2013 ... May 13, 2013 ...	AHRI 210/240–2008 (omit section 6.5). AHRI 340/360–2007 (omit section 6.3).
	Water-Source HP	<135,000 Btu/h	EER and COP	May 13, 2013 ...	ISO Standard 13256–1 (1998).
Large Commercial Packaged Air-Conditioning and Heating Equipment.	Air-Cooled AC and HP.	≥135,000 Btu/h and <240,000 Btu/h.	EER and COP	May 13, 2013 ...	AHRI 340/360–2007 (omit section 6.3).
	Water-Cooled and Evaporatively-Cooled AC.	≥135,000 Btu/h and <240,000 Btu/h.	EER	May 13, 2013 ...	AHRI 340/360–2007 (omit section 6.3).
Very Large Commercial Packaged Air-Conditioning and Heating Equipment.	Air-Cooled AC and HP.	≥240,000 Btu/h and <760,000 Btu/h.	EER and COP	May 13, 2013 ...	AHRI 340/360–2007 (omit section 6.3).
	Water-Cooled and Evaporatively-Cooled AC.	≥240,000 Btu/h and <760,000 Btu/h.	EER	May 13, 2013 ...	AHRI 340/360–2007 (omit section 6.3).
Packaged Terminal Air Conditioners and Heat Pumps. Computer Room Air Conditioners.	AC and HP	<760,000 Btu/h	EER and COP	May 13, 2013 ...	AHRI 310/380–2004 (omit section 5.6).
	AC	<65,000 Btu/h <65,000 Btu/h and <760,000 Btu/h.	SCOP SCOP	October 29, 2012. May 13, 2013 ...	ASHRAE 127–2007 (omit section 5.11). ASHRAE 127–2007 (omit section 5.11).
Variable Refrigerant Flow Multi-split Systems.	AC	<760,000 Btu/h	EER and COP	May 13, 2013 ...	AHRI 1230–2010 (omit sections 5.1.2 and 6.6).
Variable Refrigerant Flow Multi-split Systems, Air-cooled.	HP	<760,000 Btu/h	EER and COP	May 13, 2013 ...	AHRI 1230–2010 (omit sections 5.1.2 and 6.6).
Variable Refrigerant Flow Multi-split Systems, Water-source.	HP	<17,000 Btu/h	EER and COP	October 29, 2012.	AHRI 1230–2010 (omit sections 5.1.2 and 6.6).
Variable Refrigerant Flow Multi-split Systems, Water-source.	HP	≥17,000 Btu/h and <760,000 Btu/h.	EER and COP	May 13, 2013 ...	AHRI 1230–2010 (omit sections 5.1.2 and 6.6).
Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps.	AC and HP	<760,000 Btu/h	EER and COP	July 16, 2012	AHRI 390–2003 (omit section 6.4).

¹ Incorporated by reference, see § 431.95.

(c) *Optional break-in period for tests conducted using AHRI 210/240–2008, AHRI 340/360–2007, AHRI 390–2003, AHRI 1230–*

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2010, and ASHRAE 127–2007. Manufacturers may optionally specify a “break-in” period, not to exceed 20 hours, to operate the equipment under test prior to conducting the test method specified by AHRI 210/240–2008, AHRI 340/360–2007, AHRI 390–2003, AHRI 1230–2010, or ASHRAE 127–2007 (incorporated by reference, see § 431.95). A manufacturer who elects to use an optional compressor break-in period in its certification testing should record this information (including the duration) in the test data underlying the certified ratings that is required to be maintained under 10 CFR 429.71.

(d) *Refrigerant line length corrections for tests conducted using AHRI 1230–2010.* For test setups where it is physically impossible for the laboratory to use the required line length listed in Table 3 of the AHRI 1230–2010 (incorporated by reference, see § 431.95), then the actual refrigerant line length used by the laboratory may exceed the required length and the following correction factors are applied:

Piping length beyond minimum, X (ft)	Piping length beyond minimum, Y (m)	Cooling capacity correction %
0 > X ≤ 20	0 > Y ≤ 6.1	1
20 > X ≤ 40	6.1 > Y ≤ 12.2	2
40 > X ≤ 60	12.2 > Y ≤ 18.3	3
60 > X ≤ 80	18.3 > Y ≤ 24.4	4
80 > X ≤ 100	24.4 > Y ≤ 30.5	5
100 > X ≤ 120	30.5 > Y ≤ 36.6	6

(e) *Additional provisions for equipment set-up.* The only additional specifications that may be used in setting up the basic model for test are those set forth in the installation and operation manual shipped with the unit. Each unit should be set up for test in accordance with the manufacturer installation and operation manuals. Paragraphs (e)(1) through (3) of this section provide specifications for addressing key information typically found in the installation and operation manuals.

(1) If a manufacturer specifies a range of superheat, sub-cooling, and/or refrigerant pressure in its installation and operation manual for a given basic model, any value(s) within that range may be used to determine refrigerant charge or mass of refrigerant, unless the manufacturer clearly specifies a rating value in its installation and op-

eration manual, in which case the specified rating value shall be used.

(2) The air flow rate used for testing must be that set forth in the installation and operation manuals being shipped to the commercial customer with the basic model and clearly identified as that used to generate the DOE performance ratings. If a rated air flow value for testing is not clearly identified, a value of 400 standard cubic feet per minute (scfm) per ton shall be used.

(3) For VRF systems, the test set-up and the fixed compressor speeds (*i.e.*, the maximum, minimum, and any intermediate speeds used for testing) should be recorded and maintained as part of the test data underlying the certified ratings that is required to be maintained under 10 CFR 429.71.

(f) *Manufacturer involvement in assessment or enforcement testing for variable refrigerant flow systems.* A manufacturer’s representative will be allowed to witness assessment and/or enforcement testing for VRF systems. The manufacturer’s representative will be allowed to inspect and discuss set-up only with a DOE representative and adjust only the modulating components during testing in the presence of a DOE representative that are necessary to achieve steady-state operation. Only previously documented specifications for set-up as specified under paragraphs (d) and (e) of this section will be used.

[77 FR 28989, May 16, 2012]

ENERGY EFFICIENCY STANDARDS

§ 431.97 Energy efficiency standards and their compliance dates.

(a) All basic models of commercial package air-conditioning and heating equipment must be tested for performance using the applicable DOE test procedure in § 431.96, be compliant with the applicable standards set forth in paragraphs (b) through (f) of this section, and be certified to the Department under 10 CFR part 429.

(b) Each commercial air conditioner or heat pump (not including single package vertical air conditioners and single package vertical heat pumps, packaged terminal air conditioners and

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packaged terminal heat pumps, computer room air conditioners, and variable refrigerant flow systems) manufactured on and after the compliance date listed in the corresponding table

must meet the applicable minimum energy efficiency standard level(s) set forth in Tables 1, 2, and 3 of this section.

TABLE 1 TO § 431.97—MINIMUM COOLING EFFICIENCY STANDARDS FOR AIR-CONDITIONING AND HEATING EQUIPMENT

[Not including single package vertical air conditioners and single package vertical heat pumps, packaged terminal air conditioners and packaged terminal heat pumps, computer room air conditioners, and variable refrigerant flow multi-split air conditioners and heat pumps]

Equipment type	Cooling capacity	Sub-category	Heating type	Efficiency level	Compliance date: products manufactured on and after . . .
Small Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled, 3 Phase)	<65,000 Btu/h	AC HP	All All	SEER = 13 SEER = 13	June 16, 2008. June 16, 2008.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled)	≥65,000 Btu/h and <135,000 Btu/h.	AC HP	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.2 EER = 11.0	January 1, 2010. January 1, 2010.
Large Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled)	≥135,000 Btu/h and <240,000 Btu/h.	AC	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.0 EER = 10.8	January 1, 2010. January 1, 2010.
Heating Equipment (Air-Cooled).	>240,000 Btu/h	HP	No Heating or Electric Resistance heating. All Other Types of Heating.	EER = 10.6 EER = 10.4	January 1, 2010. January 1, 2010.
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled)	≥240,000 Btu/h and <760,000 Btu/h.	AC HP	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 10.0 EER = 9.8	January 1, 2010. January 1, 2010.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled, Evaporatively-Cooled, and Water-Source).	<17,000 Btu/h ≥17,000 Btu/h and <65,000 Btu/h.	AC HP AC HP	All All All All	EER = 12.1 EER = 11.2 EER = 12.1 EER = 12.0	October 29, 2003. October 29, 2003. October 29, 2003. October 29, 2003.
	≥65,000 Btu/h and <135,000 Btu/h.	AC HP	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.5 EER = 11.3	October 29, 2003. ¹ October 29, 2003. ¹
Large Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled, Evaporatively-Cooled, and Water-Source).	≥135,000 Btu/h and <240,000 Btu/h	HP AC HP	All All All	EER = 12.0 EER = 11.0 EER = 11.0	October 29, 2003. ¹ October 29, 2004. ² October 29, 2004. ²
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled, Evaporatively-Cooled, and Water-Source).	≥240,000 Btu/h and <760,000 Btu/h.	AC HP	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.0 EER = 10.8	January 10, 2011. ² January 10, 2011. ²
		HP	No Heating or Electric Resistance Heating. All Other Types of Heating.	EER = 11.0 EER = 10.8	January 10, 2011. ² January 10, 2011. ²

¹ And manufactured before June 1, 2013. See Table 3 of this section for updated efficiency standards.

² And manufactured before June 1, 2014. See Table 3 of this section for updated efficiency standards.

TABLE 2 TO § 431.97—MINIMUM HEATING EFFICIENCY STANDARDS FOR AIR-CONDITIONING AND HEATING EQUIPMENT
[Heat pumps]

Equipment type	Cooling capacity	Efficiency level	Compliance date: Products manufactured on and after . . .
Small Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled, 3 Phase).	<65,000 Btu/h	HSPF = 7.7	June 16, 2008.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled).	≥65,000 Btu/h and	COP = 3.3 ..	January 1, 2010.
Large Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled).	<135,000 Btu/h	COP = 3.2 ..	January 1, 2010.
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Air-Cooled).	≥135,000 Btu/h and	COP = 3.2 ..	January 1, 2010.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Water-Source).	<240,000 Btu/h	COP = 4.2 ..	October 29, 2003.
	≥240,000 Btu/h and		
	<760,000 Btu/h		

TABLE 3 TO § 431.97—UPDATES TO THE MINIMUM COOLING EFFICIENCY STANDARDS FOR WATER-COOLED AND EVAPORATIVELY-COOLED AIR-CONDITIONING AND HEATING EQUIPMENT

Equipment type	Cooling capacity	Heating type	Efficiency level	Compliance date: Products manufactured on and after . . .
Small Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled).	≥65,000 Btu/h and <135,000 Btu/h.	No Heating or Electric Resistance Heating.	EER = 12.1	June 1, 2013.
Large Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled).	≥135,000 Btu/h and <240,000 Btu/h.	All Other Types of Heating	EER = 11.9	June 1, 2013.
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Water-Cooled).	≥240,000 Btu/h and <760,000 Btu/h.	No Heating or Electric Resistance Heating.	EER = 12.5	June 1, 2014.
Small Commercial Packaged Air-Conditioning and Heating Equipment (Evaporatively-Cooled).	≥65,000 Btu/h and <135,000 Btu/h.	All Other Types of Heating	EER = 12.3	June 1, 2014.
Large Commercial Packaged Air-Conditioning and Heating Equipment (Evaporatively-Cooled).	≥135,000 Btu/h and <240,000 Btu/h.	No Heating or Electric Resistance Heating.	EER = 12.4	June 1, 2014.
Very Large Commercial Packaged Air-Conditioning and Heating Equipment (Evaporatively-Cooled).	≥240,000 Btu/h and <760,000 Btu/h.	All Other Types of Heating	EER = 12.2	June 1, 2014.
		No Heating or Electric Resistance Heating.	EER = 12.1	June 1, 2013.
		All Other Types of Heating	EER = 11.9	June 1, 2013.
		No Heating or Electric Resistance Heating.	EER = 12.0	June 1, 2014.
		All Other Types of Heating	EER = 11.8	June 1, 2014.
		No Heating or Electric Resistance Heating.	EER = 11.9	June 1, 2014.
		All Other Types of Heating	EER = 11.7	June 1, 2014.

(c) Each packaged terminal air conditioner (PTAC) and packaged terminal heat pump (PTHP) manufactured on or after January 1, 1994, and before October 8, 2012 (for standard size PTACs and PTHPs) and before October 7, 2010 (for non-standard size PTACs and PTHPs) must meet the applicable minimum energy efficiency standard level(s) set

forth in Table 4 of this section. Each PTAC and PTHP manufactured on or after October 8, 2012 (for standard size PTACs and PTHPs) and on or after October 7, 2010 (for non-standard size PTACs and PTHPs) must meet the applicable minimum energy efficiency standard level(s) set forth in Table 5 of this section.

TABLE 4 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR PTAC AND PTHP

Equipment type	Cooling capacity	Efficiency level	Compliance date: products manufactured on and after . . .
PTAC	<7,000 Btu/h	EER = 8.88	January 1, 1994.
	≥7,000 Btu/h and <15,000 Btu/h.	EER = 10.0—(0.16 × Cap ¹)	January 1, 1994.
PTHP	≥15,000 Btu/h	EER = 7.6	January 1, 1994.
	<7,000 Btu/h	EER = 8.88	January 1, 1994.
		COP = 2.72	

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TABLE 4 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR PTAC AND PTHP—Continued

Equipment type	Cooling capacity	Efficiency level	Compliance date: products manufactured on and after . . .
	≥7,000 Btu/h and <15,000 Btu/h.	EER = 10.0—(0.16 × Cap ¹) COP = 1.3 + (0.16 × EER ²)	January 1, 1994.
	≥15,000 Btu/h	EER = 7.6 COP = 2.52	January 1, 1994.

¹ “Cap” means cooling capacity in thousand Btu/h at 95 °F outdoor dry-bulb temperature.

² The applicable minimum cooling EER prescribed in this table.

TABLE 5 TO § 431.97—UPDATED MINIMUM EFFICIENCY STANDARDS FOR PTAC AND PTHP

Equipment type	Cooling capacity	Sub-category	Efficiency level	Compliance date: Products manufactured on and after . . .
PTAC	Standard Size	<7,000 Btu/h	EER = 11.7	October 8, 2012.
		≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 13.8 — (0.3 × Cap ¹)	October 8, 2012.
	Non-Standard Size	>15,000 Btu/h	EER = 9.3	October 8, 2012.
		<7,000 Btu/h	EER = 9.4	October 7, 2010.
		≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 10.9 — (0.213 × Cap ¹).	October 7, 2010.
		>15,000 Btu/h	EER = 7.7	October 7, 2010.
PTHP	Standard Size	<7,000 Btu/h	EER = 11.9 COP = 3.3	October 8, 2012.
		≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 14.0 — (0.3 × Cap ¹) COP = 3.7 — (0.052 × Cap ¹).	October 8, 2012.
	Non-Standard Size	>15,000 Btu/h	EER = 9.5 COP = 2.9	October 8, 2012.
		<7,000 Btu/h	EER = 9.3 COP = 2.7	October 7, 2010.
		≥7,000 Btu/h and ≤15,000 Btu/h.	EER = 10.8 — (0.213 × Cap ¹).	October 7, 2010.
		>15,000 Btu/h	COP = 2.9 — (0.026 × Cap ¹).	October 7, 2010.
			EER = 7.6	
			COP = 2.5	

¹ “Cap” means cooling capacity in thousand Btu/h at 95 °F outdoor dry-bulb temperature.

(d) Each single package vertical air conditioner and heat pump manufactured on or after January 1, 2010, must meet the applicable minimum energy efficiency standard level(s) set forth in this section.

TABLE 6 TO § 431.97 MINIMUM EFFICIENCY STANDARDS FOR SINGLE PACKAGE VERTICAL AIR CONDITIONERS AND SINGLE PACKAGE VERTICAL HEAT PUMPS

Equipment type	Cooling capacity	Sub-category	Efficiency level	Compliance date: Products manufactured on and after . . .
Single package vertical air conditioners and single package vertical heat pumps, single-phase and three-phase.	<65,000 Btu/h	AC HP	EER = 9.0 EER = 9.0 COP = 3.0	January 1, 2010. January 1, 2010.
Single package vertical air conditioners and single package vertical heat pumps.	≥65,000 Btu/h and <135,000 Btu/h.	AC HP	EER = 8.9 EER = 8.9 COP = 3.0	January 1, 2010. January 1, 2010.
Single package vertical air conditioners and single package vertical heat pumps.	≥135,000 Btu/h and <240,000 Btu/h.	AC HP	EER = 8.6 EER = 8.6 COP = 2.9	January 1, 2010. January 1, 2010.

(e) Each computer room air conditioner with a net sensible cooling capacity less than 65,000 Btu/h manufactured on or after October 29, 2012, and

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each computer room air conditioner with a net sensible cooling capacity greater than or equal to 65,000 Btu/h manufactured on or after October 29, 2013, must meet the applicable minimum energy efficiency standard level(s) set forth in this section.

TABLE 7 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR COMPUTER ROOM AIR CONDITIONERS

Equipment type	Net sensible cooling capacity	Minimum SCOP efficiency		Compliance date: Products manufactured on and after . . .
		Downflow unit	Upflow unit	
Computer Room Air Conditioners, Air-Cooled.	<65,000 Btu/h	2.20	2.09	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.10	1.99	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	1.90	1.79	October 29, 2013.
Computer Room Air Conditioners, Water-Cooled.	<65,000 Btu/h	2.60	2.49	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.50	2.39	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	2.40	2.29	October 29, 2013.
Computer Room Air Conditioners, Water-Cooled with a Fluid Economizer.	<65,000 Btu/h	2.55	2.44	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.45	2.34	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	2.35	2.24	October 29, 2013.
Computer Room Air Conditioners, Glycol-Cooled.	<65,000 Btu/h	2.50	2.39	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.15	2.04	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	2.10	1.99	October 29, 2013.
Computer Room Air Conditioner, Glycol-Cooled with a Fluid Economizer.	<65,000 Btu/h	2.45	2.34	October 29, 2012.
	≥65,000 Btu/h and <240,000 Btu/h.	2.10	1.99	October 29, 2013.
	≥240,000 Btu/h and <760,000 Btu/h.	2.05	1.94	October 29, 2013.

(f) Each variable refrigerant flow air conditioner or heat pump manufactured on or after the compliance date listed in this table must meet the applicable minimum energy efficiency standard level(s) set forth in this section.

TABLE 8 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR VARIABLE REFRIGERANT FLOW MULTI-SPLIT AIR CONDITIONERS AND HEAT PUMPS

Equipment type	Cooling capacity	Heating type ¹	Efficiency level	Compliance date: Products manufactured on and after . . .
VRF Multi-Split Air Conditioners (Air-Cooled).	<65,000 Btu/h	All	13.0 SEER	June 16, 2008.
	≥65,000 Btu/h and <135,000 Btu/h.	No Heating or Electric Resistance Heating.	11.2 EER	January 1, 2010.
		All Other Types of Heating.	11.0 EER	January 1, 2010.
	≥135,000 Btu/h and <240,000 Btu/h.	No Heating or Electric Resistance Heating.	11.0 EER	January 1, 2010.
		All Other Types of Heating.	10.8 EER	January 1, 2010.
	≥240,000 Btu/h and <760,000 Btu/h.	No Heating or Electric Resistance Heating.	10.0 EER	January 1, 2010.
VRF Multi-Split Heat Pumps (Air-Cooled)		All Other Types of Heating.	9.8 EER	January 1, 2010.
	<65,000 Btu/h	All	13.0 SEER	June 16, 2008.
	≥65,000 Btu/h and <135,000 Btu/h.	No Heating or Electric Resistance Heating.	7.7 HSPF	
			11.0 EER	January 1, 2010.
			3.3 COP	

TABLE 8 TO § 431.97—MINIMUM EFFICIENCY STANDARDS FOR VARIABLE REFRIGERANT FLOW MULTI-SPLIT AIR CONDITIONERS AND HEAT PUMPS—Continued

Equipment type	Cooling capacity	Heating type ¹	Efficiency level	Compliance date: Products manufactured on and after . . .
VRF Multi-Split Heat Pumps (Water-Source)* * *	≥135,000 Btu/h and <240,000 Btu/h.	All Other Types of Heating.	10.8 EER	January 1, 2010.
		No Heating or Electric Resistance Heating.	3.3 COP 10.6 EER	January 1, 2010.
	≥240,000 Btu/h and <760,000 Btu/h.	All Other Types of Heating.	10.4 EER	January 1, 2010.
		No Heating or Electric Resistance Heating.	3.2 COP 9.5 EER	January 1, 2010.
	<17,000 Btu/h	All Other Types of Heating.	9.3 EER	January 1, 2010.
		Without heat recovery.	3.2 COP 12.0 EER	October 29, 2012.
	≥17,000 Btu/h and <65,000 Btu/h.	With heat recovery ..	4.2 COP	October 29, 2003.
		All	11.8 EER	October 29, 2012.
	≥65,000 Btu/h and <135,000 Btu/h.	Without heat recovery.	4.2 COP	October 29, 2003.
		All	12.0 EER	October 29, 2003.
	≥135,000 Btu/h and <760,000 Btu/h.	Without heat recovery.	12.0 EER	October 29, 2003.
		With heat recovery ..	4.2 COP 10.0 EER	October 29, 2013.

¹ VRF Multi-Split Heat Pumps (Air-Cooled) with heat recovery fall under the category of "All Other Types of Heating" unless they also have electric resistance heating, in which case it falls under the category for "No Heating or Electric Resistance Heating."

[77 FR 28991, May 16, 2012, as amended at 77 FR 76830, Dec. 31, 2012]

Subpart G—Commercial Water Heaters, Hot Water Supply Boilers and Unfired Hot Water Storage Tanks

SOURCE: 69 FR 61983, Oct. 21, 2004, unless otherwise noted.

§ 431.101 Purpose and scope.

This subpart contains energy conservation requirements for certain commercial water heaters, hot water supply boilers and unfired hot water storage tanks, pursuant to Part C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311–6317.

[69 FR 61983, Oct. 21, 2004, as amended at 70 FR 60415, Oct. 18, 2005]

§ 431.102 Definitions concerning commercial water heaters, hot water supply boilers, and unfired hot water storage tanks.

The following definitions apply for purposes of this subpart G, and of subparts J through M of this part. Any

words or terms not defined in this section or elsewhere in this part shall be defined as provided in section 340 of the Act, 42 U.S.C. 6311.

ASTM-D-2156-80 means the test standard published in 1980 by the American Society of Testing and Measurements and titled Method for Smoke Density in Flue Gases from Burning Distillate Fuels.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Hot water supply boiler means a packaged boiler that is industrial equipment and that,

(1) Has an input rating from 300,000 Btu/hr to 12,500,000 Btu/hr and of at least 4,000 Btu/hr per gallon of stored water,

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(2) Is suitable for heating potable water, and

(3) Meets either or both of the following conditions:

(i) It has the temperature and pressure controls necessary for heating potable water for purposes other than space heating, or

(ii) The manufacturer's product literature, product markings, product marketing, or product installation and operation instructions indicate that the boiler's intended uses include heating potable water for purposes other than space heating.

Instantaneous water heater means a water heater that has an input rating not less than 4,000 Btu/hr per gallon of stored water, and that is industrial equipment, including products meeting this description that are designed to heat water to temperatures of 180 °F or higher.

Packaged boiler means a boiler that is shipped complete with heating equipment, mechanical draft equipment and automatic controls; usually shipped in one or more sections and does not include a boiler that is custom designed and field constructed. If the boiler is shipped in more than one section, the sections may be produced by more than one manufacturer, and may be originated or shipped at different times and from more than one location.

R-value means the thermal resistance of insulating material as determined based on ASTM Standard Test Method C177-97 or C518-91 and expressed in (°F·ft²·h/Btu).

Standby loss means the average hourly energy required to maintain the stored water temperature, expressed as applicable either (1) as a percentage (per hour) of the heat content of the stored water and determined by the formula for S given in Section 2.10 of ANSI Z21.10.3-1998, denoted by the term "S," or (2) in Btu per hour based on a 70 °F temperature differential between stored water and the ambient temperature, denoted by the term "SL."

Storage water heater means a water heater that heats and stores water within the appliance at a thermostatically controlled temperature for delivery on demand and that is industrial equipment. Such term does not include units with an input rating

of 4,000 Btu/hr or more per gallon of stored water.

Tank surface area means, for the purpose of determining portions of a tank requiring insulation, those areas of a storage tank, including hand holes and manholes, in its uninsulated or pre-insulated state, that do not have pipe penetrations or tank supports attached.

Thermal efficiency for an instantaneous water heater, a storage water heater or a hot water supply boiler means the ratio of the heat transferred to the water flowing through the water heater to the amount of energy consumed by the water heater as measured during the thermal efficiency test procedure prescribed in this subpart.

Unfired hot water storage tank means a tank used to store water that is heated externally, and that is industrial equipment.

[69 FR 61983, Oct. 21, 2004, as amended at 76 FR 12503, Mar. 7, 2011]

§ 431.104 Sources for information and guidance.

(a) *General.* The standards listed in this paragraph are referred to in the DOE test procedures and elsewhere in this part but are not incorporated by reference. These sources are given here for information and guidance.

(b) *ASTM.* American Society for Testing and Materials, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19438-2959, 1-(877) 909-2786, or go to: <http://www.astm.org/index.shtml>.

(1) ASTM Standard Test Method C177-97, "Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus."

(2) ASTM Standard Test Method C518-91, "Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus."

(3) ASTM Standard Test Method D2156-80, "Method for Smoke Density in Flue Gases from Burning Distillate Fuels."

[77 FR 28995, May 16, 2012]

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TEST PROCEDURES

§ 431.105 Materials incorporated by reference.

(a) *General.* DOE incorporates by reference the following test procedures into subpart G of part 431. The materials listed have been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to the listed materials by the standard-setting organization will not affect the DOE regulations unless and until such regulations are amended by DOE. Materials are incorporated as they exist on the date of the approval, and a notice of any change in the materials will be published in the FEDERAL REGISTER. All approved materials are available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030, or go to: http://www.archives.gov/federal_register/code_of_federalregulations/ibr_locations.html. Also, this material is available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, (202) 586-2945, or go to: http://www1.eere.energy.gov/buildings/appliance_standards. The referenced test procedure standards are listed below by relevant standard-setting organization, along with information on how to obtain copies from those sources.

(b) *ANSI.* American National Standards Institute, 25 W. 43rd Street, 4th

Floor, New York, NY 10036, (212) 642-4900, or go to: <http://www.ansi.org>.

(1) ANSI Z21.10.3-1998 (“ANSI Z21.10.3-1998”), “*Gas Water Heaters, Volume III, Storage Water Heaters With Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous*, Z21.10.3-1998, CSA 4.3-M98, and its Addenda, ANSI Z21.10.3a-2000, CSA 4.3a-M00,” approved by ANSI on October 18, 1999, IBR approved for § 431.106.

(2) ANSI Z21.10.3-2011 (“ANSI Z21.10.3-2011”), “*Gas Water Heaters, Volume III, Storage Water Heaters With Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous*,” approved on March 7, 2011, IBR approved for § 431.106.

(3) [Reserved].

[77 FR 28996, May 16, 2012]

§ 431.106 Uniform test method for the measurement of energy efficiency of commercial water heaters and hot water supply boilers (other than commercial heat pump water heaters).

(a) *Scope.* This section covers the test procedures you must follow if, pursuant to EPCA, you are measuring the thermal efficiency or standby loss, or both, of a storage or instantaneous water heater or hot water supply boiler (other than a commercial heat pump water heater).

(b) *Testing and Calculations.* Determine the energy efficiency of each covered product by conducting the test procedure(s), set forth in the two rightmost columns of the following table, that apply to the energy efficiency descriptor(s) for that product:

TABLE 1 TO § 431.106—TEST PROCEDURES FOR COMMERCIAL WATER HEATERS AND HOT WATER SUPPLY BOILERS

[Other than commercial heat pump water heaters]

Equipment type	Energy efficiency descriptor	Use test setup, equipment and procedures in subsection labeled "Method of Test" of	Test procedure required for compliance until	With these additional stipulations
Gas-fired Storage and Instantaneous Water Heaters and Hot Water Supply Boilers*.	Thermal Efficiency Standby Loss	ANSI Z21.10.3–1998 **, § 2.9. ANSI Z21.10.3–1998 **, § 2.10.	May 13, 2013 May 13, 2013	<p>A. For all products, the duration of the standby loss test shall be until whichever of the following occurs first after you begin to measure the fuel and/or electric consumption: (1) The first cutout after 24 hours or (2) 48 hours, if the water heater is not in the heating mode at that time.</p> <p>B. For oil and gas products, the standby loss in Btu per hour must be calculated as follows: $SL \text{ (Btu per hour)} = S \text{ (\% per hour)} \times 8.25 \text{ (Btu/gal-F)} \times \text{Measured Volume (gal)} \times 70 \text{ (degrees F)}.$</p> <p>C. For oil-fired products, apply the following in conducting the thermal efficiency and standby loss tests: (1) Venting Requirements—Connect a vertical length of flue pipe to the flue gas outlet of sufficient height so as to meet the minimum draft specified by the manufacturer. (2) Oil Supply—Adjust the burner rate so that: (a) The hourly Btu input rate lies within ± 2 percent of the manufacturer's specified input rate, (b) the CO₂ reading shows the value specified by the manufacturer, (c) smoke in the flue does not exceed No. 1 smoke as measured by the procedure in ASTM–D–2156–80, and (d) fuel pump pressure lies within ± 10 percent of manufacturer's specifications.</p>

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TABLE 1 TO § 431.106—TEST PROCEDURES FOR COMMERCIAL WATER HEATERS AND HOT WATER
SUPPLY BOILERS—Continued

[Other than commercial heat pump water heaters]

Equipment type	Energy efficiency descriptor	Use test setup, equipment and procedures in subsection labeled "Method of Test" of	Test procedure required for compliance until	With these additional stipulations
				<p>D. For electric products, apply the following in conducting the standby loss test: (1) Assume that the thermal efficiency (Et) of electric water heaters with immersed heating elements is 98 percent. (2) Maintain the electrical supply voltage to within ± 5 percent of the center of the voltage range specified on the water heater nameplate. (3) If the set up includes multiple adjustable thermostats, set the highest one first to yield a maximum water temperature in the specified range as measured by the topmost tank thermocouple. Then set the lower thermostat(s) to yield a maximum mean tank temperature within the specified range.</p> <p>E. Install water-tube water heaters as shown in Figure 2, "Arrangement for Testing Water-tube Type Instantaneous and Circulating Water Heaters."</p>

* As to hot water supply boilers with a capacity of less than 10 gallons, these test methods become mandatory on October 21, 2005. Prior to that time, you may use for these products either (1) these test methods if you rate the product for thermal efficiency, or (2) the test methods in Subpart E if you rate the product for combustion efficiency as a commercial packaged boiler.

** Incorporated by reference, see § 431.105.

TABLE 2 TO § 431.106—TEST PROCEDURES FOR COMMERCIAL WATER HEATERS AND HOT WATER SUPPLY BOILERS

[Other than commercial heat pump water heaters]

Equipment type	Energy efficiency descriptor	Use test setup, equipment and procedures in sub-section labeled "Method of Test" of	Test procedure required for compliance on and after	With these additional stipulations
Gas-fired Storage and Instantaneous Water Heaters and Hot Water Supply Boilers*. Oil-fired Storage and Instantaneous Water Heaters and Hot Water Supply Boilers*. Electric Storage and Instantaneous Water Heaters.	Thermal Efficiency Standby Loss Thermal Efficiency Standby Loss Standby Loss	ANSI Z21.10.3–2011 **, Exhibit G1. ANSI Z21.10.3–2011 **, Exhibit G2. ANSI Z21.10.3–2011 **, Exhibit G1. ANSI Z21.10.3–2011 **, Exhibit G2. ANSI Z21.10.3–2011 **, Exhibit G2.	May 13, 2013 May 13, 2013 May 13, 2013 May 13, 2013 May 13, 2013	A. For all products, the duration of the standby loss test shall be until whichever of the following occurs first after you begin to measure the fuel and/or electric consumption: (1) The first cutout after 24 hours or (2) 48 hours, if the water heater is not in the heating mode at that time. B. For oil and gas products, the standby loss in Btu per hour must be calculated as follows: $SL \text{ (Btu per hour)} = S \text{ (\% per hour)} \times 8.25 \text{ (Btu/gal-F)} \times \text{Measured Volume (gal)} \times 70 \text{ (degrees F)}$. C. For oil-fired products, apply the following in conducting the thermal efficiency and standby loss tests: (1) Venting Requirements—Connect a vertical length of flue pipe to the flue gas outlet of sufficient height so as to meet the minimum draft specified by the manufacturer. (2) Oil Supply—Adjust the burner rate so that: (a) The hourly Btu input rate lies within ± 2 percent of the manufacturer's specified input rate, (b) the CO ₂ reading shows the value specified by the manufacturer, (c) smoke in the flue does not exceed No. 1 smoke as measured by the procedure in ASTM–D–2156–80, and (d) fuel pump pressure lies within ± 10 percent of manufacturer's specifications.

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TABLE 2 TO § 431.106—TEST PROCEDURES FOR COMMERCIAL WATER HEATERS AND HOT WATER SUPPLY BOILERS—Continued
[Other than commercial heat pump water heaters]

Equipment type	Energy efficiency descriptor	Use test setup, equipment and procedures in subsection labeled "Method of Test" of	Test procedure required for compliance on and after	With these additional stipulations
				<p>D. For electric products, apply the following in conducting the standby loss test: (1) Assume that the thermal efficiency (Et) of electric water heaters with immersed heating elements is 98 percent. (2) Maintain the electrical supply voltage to within ± 5 percent of the center of the voltage range specified on the water heater nameplate. (3) If the set up includes multiple adjustable thermostats, set the highest one first to yield a maximum water temperature in the specified range as measured by the topmost tank thermocouple. Then set the lower thermostat(s) to yield a maximum mean tank temperature within the specified range.</p> <p>E. Install water-tube water heaters as shown in Figure 2, "Arrangement for Testing Water-tube Type Instantaneous and Circulating Water Heaters."</p>

* As to hot water supply boilers with a capacity of less than 10 gallons, these test methods become mandatory on October 21, 2005. Prior to that time, you may use for these products either (1) these test methods if you rate the product for thermal efficiency, or (2) the test methods in Subpart E if you rate the product for combustion efficiency as a commercial packaged boiler.

** Incorporated by reference, see § 431.105.

[77 FR 28996, May 16, 2012]

§ 431.107 Uniform test method for the measurement of energy efficiency of commercial heat pump water heaters. [Reserved]

ENERGY CONSERVATION STANDARDS

§ 431.110 Energy conservation standards and their effective dates.

Each commercial storage water heater, instantaneous water heater, unfired hot water storage tank and hot water supply boiler¹ must meet the applicable energy conservation standard level(s) as follows:

¹ Any packaged boiler that provides service water, that meets the definition of "commercial packaged boiler" in subpart E of this part, but does not meet the definition of "hot water supply boiler" in subpart G, must meet the requirements that apply to it under subpart E.

Product	Size	Energy conservation standard ^a (products manufactured on and after October 29, 2003) ^b	
		Minimum thermal efficiency	Maximum standby loss ^c
Electric storage water heaters.	All	N/A	$0.30 + 27/V_m$ (%/hr)
Gas-fired storage water heaters.	≤155,000 Btu/hr ...	80%	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr)
	>155,000 Btu/hr ...	80%	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr)
Oil-fired storage water heaters.	≤155,000 Btu/hr ...	78%	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr)
	>155,000 Btu/hr ...	78%	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr)
Gas-fired instantaneous water heaters and hot water supply boilers.	<10 gal	80%	N/A
	≥10 gal	80%	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr)
Oil-fired instantaneous water heaters and hot water supply boilers.	<10 gal	80%	N/A
	≥10 gal	78%	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr)
Product	Size	Minimum thermal insulation	
Unfired hot water storage tank.	All	R–12.5	

^a V_m is the measured storage volume and V_r is the rated volume, both in gallons. Q is the nameplate input rate in Btu/hr.
^b For hot water supply boilers with a capacity of less than 10 gallons: (1) the standards are mandatory for products manufactured on and after October 21, 2005, and (2) products manufactured prior to that date, and on or after October 23, 2003, must meet either the standards listed in this table or the applicable standards in subpart E of this part for a “commercial packaged boiler.”
^c Water heaters and hot water supply boilers having more than 140 gallons of storage capacity need not meet the standby loss requirement if (1) the tank surface area is thermally insulated to R–12.5 or more, (2) a standing pilot light is not used and (3) for gas or oil-fired storage water heaters, they have a fire damper or fan assisted combustion.

[69 FR 61983, Oct. 21, 2004; 69 FR 63574, Nov. 2, 2004]

Subpart H—Automatic Commercial Ice Makers

SOURCE: 70 FR 60415, Oct. 18, 2005, unless otherwise noted.

§ 431.131 Purpose and scope.

This subpart contains energy conservation requirements for commercial ice makers, pursuant to Part C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311–6317.

§ 431.132 Definitions concerning automatic commercial ice makers.

Automatic commercial ice maker means a factory-made assembly (not necessarily shipped in 1 package) that—

(1) Consists of a condensing unit and ice-making section operating as an integrated unit, with means for making and harvesting ice; and

(2) May include means for storing ice, dispensing ice, or storing and dispensing ice.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially

identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Batch type ice maker means an ice maker having alternate freezing and harvesting periods. This includes automatic commercial ice makers that produce cube type ice and other batch technologies. Referred to as cubes type ice maker in AHRI 810 (incorporated by reference, see § 431.133).

Continuous type ice maker means an ice maker that continually freezes and harvests ice at the same time.

Cube type ice means ice that is fairly uniform, hard, solid, usually clear, and generally weighs less than two ounces (60 grams) per piece, as distinguished from flake, crushed, or fragmented ice. Note that this conflicts and takes precedence over the definition established in AHRI 810 (incorporated by reference, see § 431.133), which indicates that “cube” does not reference a specific size or shape.

Energy use means the total energy consumed, stated in kilowatt hours per one-hundred pounds (kWh/100 lb) of ice stated in multiples of 0.1. For remote

condensing (but not remote compressor) automatic commercial ice makers and remote condensing and remote compressor automatic commercial ice makers, total energy consumed shall include the energy use of the ice-making mechanism, the compressor, and the remote condenser or condensing unit.

Harvest rate means the amount of ice (at 32 degrees F) in pounds produced per 24 hours.

Ice hardness factor means the latent heat capacity of harvested ice, in British thermal units per pound of ice (Btu/lb), divided by 144 Btu/lb, expressed as a percent.

Ice-making head means automatic commercial ice makers that do not contain integral storage bins, but are generally designed to accommodate a variety of bin capacities. Storage bins entail additional energy use not included in the reported energy consumption figures for these units.

Maximum condenser water use means the maximum amount of water used by the condensing unit (if water-cooled), stated in gallons per 100 pounds (gal/100 lb) of ice, in multiples of 1.

Remote compressor means a type of automatic commercial ice maker in which the ice-making mechanism and compressor are in separate sections.

Remote condensing means a type of automatic commercial ice maker in which the ice-making mechanism and condenser or condensing unit are in separate sections.

Self-contained means a type of automatic commercial ice maker in which the ice-making mechanism and storage compartment are in an integral cabinet.

[70 FR 60415, Oct. 18, 2005, as amended at 71 FR 71371, Dec. 8, 2006; 76 FR 12503, Mar. 7, 2011; 77 FR 1613, Jan. 11, 2012]

TEST PROCEDURES

§ 431.133 Materials incorporated by reference.

(a) *General.* We incorporate by reference the following standards into Subpart H of Part 431. The material listed has been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any

subsequent amendment to a standard by the standard-setting organization will not affect the DOE regulations unless and until amended by DOE. Material is incorporated as it exists on the date of the approval and a notice of any change in the material will be published in the FEDERAL REGISTER. All approved material is available for inspection at the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza SW., Washington, DC 20024, (202) 586-2945, or go to: http://www1.eere.energy.gov/buildings/appliance_standards/. Also, this material is available for inspection at National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030 or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. Standards can be obtained from the sources listed below.

(b) *AHRI.* Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Blvd., Suite 500, Arlington, VA 22201, (703) 524-8800, ahri@ahrinet.org, or <http://www.ahrinet.org>.

(1) AHRI Standard 810-2007 with Addendum 1, ("AHRI 810"), *Performance Rating of Automatic Commercial Ice-Makers*, March 2011; IBR approved for §§ 431.132 and 431.134.

(2) [Reserved]

(c) *ASHRAE.* American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle NE., Atlanta, GA 30329, (404) 636-8400, ashrae@ashrae.org, or <http://www.ashrae.org>.

(1) ANSI/ASHRAE Standard 29-2009, ("ANSI/ASHRAE 29"), *Method of Testing Automatic Ice Makers*, (including Errata Sheets issued April 8, 2010 and April 21, 2010), approved January 28, 2009; IBR approved for § 431.134.

(2) [Reserved]

[77 FR 1613, Jan. 11, 2012]

§ 431.134 Uniform test methods for the measurement of energy and water consumption of automatic commercial ice makers.

(a) *Scope.* This section provides the test procedures for measuring, pursuant to EPCA, the energy use in kilowatt hours per 100 pounds of ice (kWh/100 lb ice) and the condenser water use in gallons per 100 pounds of ice (gal/100 lb ice) of automatic commercial ice makers with capacities between 50 and 4,000 pounds of ice per 24 hours.

(b) *Testing and Calculations.* Measure the energy use and the condenser water use of each covered product by conducting the test procedures set forth in AHRI 810, section 3, “Definitions,” section 4, “Test Requirements,” and section 5, “Rating Requirements” (incorporated by reference, see § 431.133). Where AHRI 810 references “ASHRAE

Standard 29,” ANSI/ASHRAE Standard 29–2009 (incorporated by reference, see § 431.133) shall be used. All references to cube type ice makers in AHRI 810 apply to all batch type automatic commercial ice makers.

(1) For batch type automatic commercial ice makers, the energy use and condenser water use will be reported as measured in this paragraph (b), including the energy and water consumption, as applicable, of the ice-making mechanism, the compressor, and the condenser or condensing unit.

(2)(i) For continuous type automatic commercial ice makers, determine the energy use and condenser water use by multiplying the energy consumption or condenser water use as measured in this paragraph (b) by the ice hardness adjustment factor, determined using the following equation:

$$\text{Ice Hardness Adjustment Factor} = \left[\frac{144 \text{ Btu/lb} + 38 \text{ Btu/lb}}{144 \text{ Btu/lb} \times (\text{Ice Hardness Factor}/100) + 38 \text{ Btu/lb}} \right]$$

(ii) Determine the ice hardness factor by following the procedure specified in the “Procedure for Determining Ice Quality” in section A.3 of normative annex A of ANSI/ASHRAE 29 (incorporated by reference, see § 431.133), except that the test shall be conducted at an ambient air temperature of 70 °F ± 1 °F, with an initial water temperature of 90 °F ± 1 °F, and weights shall be accurate to within ± 2 percent of the quantity measured. The ice hardness factor is equivalent to the corrected net cooling effect per pound of ice, line 19 in ANSI/ASHRAE 29 Table A1, where the calorimeter constant used in line 18

shall be that determined in section A2 using seasoned, block ice.

[77 FR 1613, Jan. 11, 2012]

ENERGY CONSERVATION STANDARDS

§ 431.136 Energy conservation standards and their effective dates.

Each automatic commercial ice maker that produces cube type ice with capacities between 50 and 2500 pounds per 24-hour period when tested according to the test standard established in accordance with section 343 of EPCA (42 U.S.C. 6314) and is manufactured on or after January 1, 2010, shall meet the following standard levels:

Equipment type	Type of cooling	Harvest rate (lbs ice/24 hours)	Maximum energy use (kWh/100 lbs ice)	Maximum condenser water use * (gal/100 lbs ice)
Ice Making Head	Water ...	<500	7.80–0.0055H	200–0.022H.
Ice Making Head	Water ...	≥500 and <1436 ..	5.58–0.0011H	200–0.022H.
Ice Making Head	Water ...	≥1436	4.0	200–0.022H.
Ice Making Head	Air	<450	10.26–0.0086H ...	Not applicable.
Ice Making Head	Air	≥450	6.89–0.0011H	Not applicable.
Remote Condensing (but not remote compressor) ...	Air	<1000	8.85–0.0038H	Not applicable.
Remote Condensing (but not remote compressor) ...	Air	≥1000	5.1	Not applicable.
Remote Condensing and Remote Compressor	Air	<934	8.85–0.0038H	Not applicable.
Remote Condensing and Remote Compressor	Air	≥934	5.3	Not applicable.
Self Contained	Water ...	<200	11.40–0.019H ...	191–0.0315H.

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Equipment type	Type of cooling	Harvest rate (lbs ice/24 hours)	Maximum energy use (kWh/100 lbs ice)	Maximum condenser water use* (gal/100 lbs ice)
Self Contained	Water ...	≥200	7.6	191–0.0315H.
Self Contained	Air	<175	18.0–0.0469H	Not applicable.
Self Contained	Air	≥175	9.8	Not applicable.

H Harvest rate in pounds per 24 hours.

*Water use is for the condenser only and does not include potable water used to make ice.

[70 FR 60415, Oct. 18, 2005; 70 FR 61698, Oct. 25, 2005]

Subpart I—Commercial Clothes Washers

TEST PROCEDURES

§ 431.154 Test procedures.

The test procedures for residential clothes washers in appendix J1 to subpart B of part 430 of this title shall be used to test commercial clothes washers.

ENERGY CONSERVATION STANDARDS

§ 431.156 Energy and water conservation standards and effective dates.

(a) Each commercial clothes washer manufactured between January 1, 2007, and January 8, 2013, shall have—

(1) A modified energy factor of at least 1.26; and

(2) A water consumption factor of not more than 9.5.

(b) Each commercial clothes washer manufactured on or after January 8, 2013, shall have a modified energy factor no less than and a water factor no greater than:

Equipment class	Modified energy factor, cu. ft./kWh/cycle	Water factor, gal./cu. ft./cycle
Top-Loading	1.60	8.5
Front-Loading	2.00	5.5

[76 FR 69123, Nov. 8, 2011]

Subpart J [Reserved]

§§ 431.171–431.176 [Reserved]

Subpart K—Distribution Transformers

SOURCE: 70 FR 60416, Oct. 18, 2005, unless otherwise noted.

§ 431.191 Purpose and scope.

This subpart contains energy conservation requirements for distribution

SOURCE: 70 FR 60416, Oct. 18, 2005, unless otherwise noted.

§ 431.151 Purpose and scope.

This subpart contains energy conservation requirements for commercial clothes washers, pursuant to Part C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311–6317.

§ 431.152 Definitions concerning commercial clothes washers.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Commercial clothes washer means a soft-mounted front-loading or soft-mounted top-loading clothes washer that—

(1) Has a clothes container compartment that—

(i) For horizontal-axis clothes washers, is not more than 3.5 cubic feet; and

(ii) For vertical-axis clothes washers, is not more than 4.0 cubic feet; and

(2) Is designed for use in—

(i) Applications in which the occupants of more than one household will be using the clothes washer, such as multi-family housing common areas and coin laundries; or

(ii) Other commercial applications.

[70 FR 60416, Oct. 18, 2005, as amended at 76 FR 12504, Mar. 7, 2011]

transformers, pursuant to Parts B and C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6291–6317.

[71 FR 24995, Apr. 27, 2006]

§ 431.192 Definitions.

The following definitions apply for purposes of this subpart:

Autotransformer means a transformer that:

- (1) Has one physical winding that consists of a series winding part and a common winding part;
- (2) Has no isolation between its primary and secondary circuits; and
- (3) During step-down operation, has a primary voltage that is equal to the total of the series and common winding voltages, and a secondary voltage that is equal to the common winding voltage.

Basic model means a group of models of distribution transformers manufactured by a single manufacturer, that have the same insulation type (*i.e.*, liquid-immersed or dry-type), have the same number of phases (*i.e.*, single or three), have the same standard kVA rating, and do not have any differentiating electrical, physical or functional features that affect energy consumption. Differences in voltage and differences in basic impulse insulation level (BIL) rating are examples of differentiating electrical features that affect energy consumption.

Distribution transformer means a transformer that—

- (1) Has an input voltage of 34.5 kV or less;
- (2) Has an output voltage of 600 V or less;
- (3) Is rated for operation at a frequency of 60 Hz; and
- (4) Has a capacity of 10 kVA to 2500 kVA for liquid-immersed units and 15 kVA to 2500 kVA for dry-type units; but
- (5) The term “distribution transformer” does not include a transformer that is an—
 - (i) Autotransformer;
 - (ii) Drive (isolation) transformer;
 - (iii) Grounding transformer;
 - (iv) Machine-tool (control) transformer;
 - (v) Nonventilated transformer;
 - (vi) Rectifier transformer;

- (vii) Regulating transformer;
- (viii) Sealed transformer;
- (ix) Special-impedance transformer;
- (x) Testing transformer;
- (xi) Transformer with tap range of 20 percent or more;
- (xii) Uninterruptible power supply transformer; or
- (xiii) Welding transformer.

Drive (isolation) transformer means a transformer that:

- (1) Isolates an electric motor from the line;
- (2) Accommodates the added loads of drive-created harmonics; and
- (3) Is designed to withstand the additional mechanical stresses resulting from an alternating current adjustable frequency motor drive or a direct current motor drive.

Efficiency means the ratio of the useful power output to the total power input.

Excitation current or *no-load current* means the current that flows in any winding used to excite the transformer when all other windings are open-circuited.

Grounding transformer means a three-phase transformer intended primarily to provide a neutral point for system-grounding purposes, either by means of:

- (1) A grounded wye primary winding and a delta secondary winding; or
- (2) A transformer with its primary winding in a zig-zag winding arrangement, and with no secondary winding.

Liquid-immersed distribution transformer means a distribution transformer in which the core and coil assembly is immersed in an insulating liquid.

Load loss means, for a distribution transformer, those losses incident to a specified load carried by the transformer, including losses in the windings as well as stray losses in the conducting parts of the transformer.

Low-voltage dry-type distribution transformer means a distribution transformer that—

- (1) Has an input voltage of 600 volts or less;
- (2) Is air-cooled; and
- (3) Does not use oil as a coolant.

Machine-tool (control) transformer means a transformer that is equipped

with a fuse or other over-current protection device, and is generally used for the operation of a solenoid, contactor, relay, portable tool, or localized lighting.

Medium-voltage dry-type distribution transformer means a distribution transformer in which the core and coil assembly is immersed in a gaseous or dry-compound insulating medium, and which has a rated primary voltage between 601 V and 34.5 kV.

No-load loss means those losses that are incident to the excitation of the transformer.

Nonventilated transformer means a transformer constructed so as to prevent external air circulation through the coils of the transformer while operating at zero gauge pressure.

Phase angle means the angle between two phasors, where the two phasors represent progressions of periodic waves of either:

- (1) Two voltages;
- (2) Two currents; or
- (3) A voltage and a current of an alternating current circuit.

Phase angle correction means the adjustment (correction) of measurement data to negate the effects of phase angle error.

Phase angle error means incorrect displacement of the phase angle, introduced by the components of the test equipment.

Rectifier transformer means a transformer that operates at the fundamental frequency of an alternating-current system and that is designed to have one or more output windings connected to a rectifier.

Reference temperature means 20 °C for no-load loss, 55 °C for load loss of liquid-immersed distribution transformers at 50 percent load, and 75 °C for load loss of both low-voltage and medium-voltage dry-type distribution transformers, at 35 percent load and 50 percent load, respectively. It is the temperature at which the transformer losses must be determined, and to which such losses must be corrected if testing is done at a different point. (These temperatures are specified in the test method in appendix A to this part.)

Regulating transformer means a transformer that varies the voltage, the

phase angle, or both voltage and phase angle, of an output circuit and compensates for fluctuation of load and input voltage, phase angle or both voltage and phase angle.

Sealed transformer means a transformer designed to remain hermetically sealed under specified conditions of temperature and pressure.

Special-impedance transformer means any transformer built to operate at an impedance outside of the normal impedance range for that transformer's kVA rating. The normal impedance range for each kVA rating for liquid-immersed and dry-type transformers is shown in Tables 1 and 2, respectively.

TABLE 1—NORMAL IMPEDANCE RANGES FOR LIQUID-IMMERSED TRANSFORMERS

Single-phase transformers		Three-phase transformers	
kVA	Impedance (%)	kVA	Impedance (%)
10	1.0–4.5	15	1.0–4.5
15	1.0–4.5	30	1.0–4.5
25	1.0–4.5	45	1.0–4.5
37.5	1.0–4.5	75	1.0–5.0
50	1.5–4.5	112.5	1.2–6.0
75	1.5–4.5	150	1.2–6.0
100	1.5–4.5	225	1.2–6.0
167	1.5–4.5	300	1.2–6.0
250	1.5–6.0	500	1.5–7.0
333	1.5–6.0	750	5.0–7.5
500	1.5–7.0	1000	5.0–7.5
667	5.0–7.5	1500	5.0–7.5
833	5.0–7.5	2000	5.0–7.5
.....		2500	5.0–7.5

TABLE 2—NORMAL IMPEDANCE RANGES FOR DRY-TYPE TRANSFORMERS

Single-phase transformers		Three-phase transformers	
kVA	Impedance (%)	kVA	Impedance (%)
15	1.5–6.0	15	1.5–6.0
25	1.5–6.0	30	1.5–6.0
37.5	1.5–6.0	45	1.5–6.0
50	1.5–6.0	75	1.5–6.0
75	2.0–7.0	112.5	1.5–6.0
100	2.0–7.0	150	1.5–6.0
167	2.5–8.0	225	3.0–7.0
250	3.5–8.0	300	3.0–7.0
333	3.5–8.0	500	4.5–8.0
500	3.5–8.0	750	5.0–8.0
667	5.0–8.0	1000	5.0–8.0
833	5.0–8.0	1500	5.0–8.0
.....		2000	5.0–8.0
.....		2500	5.0–8.0

Temperature correction means the mathematical correction(s) of measurement data, obtained when a transformer is tested at a temperature that

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is different from the reference temperature, to the value(s) that would have been obtained if the transformer had been tested at the reference temperature.

Test current means the current of the electrical power supplied to the transformer under test.

Test frequency means the frequency of the electrical power supplied to the transformer under test.

Test voltage means the voltage of the electrical power supplied to the transformer under test.

Testing transformer means a transformer used in a circuit to produce a specific voltage or current for the purpose of testing electrical equipment.

Total loss means the sum of the no-load loss and the load loss for a transformer.

Transformer means a device consisting of 2 or more coils of insulated wire that transfers alternating current by electromagnetic induction from 1 coil to another to change the original voltage or current value.

Transformer with tap range of 20 percent or more means a transformer with multiple voltage taps, the highest of which equals at least 20 percent more than the lowest, computed based on the sum of the deviations of the voltages of these taps from the transformer's nominal voltage.

Underground mining distribution transformer means a medium-voltage dry-type distribution transformer that is built only for installation in an underground mine or inside equipment for use in an underground mine, and that has a nameplate which identifies the transformer as being for this use only.

Uninterruptible power supply transformer means a transformer that is used within an uninterruptible power system, which in turn supplies power to loads that are sensitive to power failure, power sags, over voltage, switching transients, line noise, and other power quality factors.

Waveform correction means the adjustment(s) (mathematical correction(s)) of measurement data obtained with a test voltage that is non-sinusoidal, to a value(s) that would have been obtained with a sinusoidal voltage.

Welding transformer means a transformer designed for use in arc welding

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equipment or resistance welding equipment.

[70 FR 60416, Oct. 18, 2005, as amended at 71 FR 24995, Apr. 27, 2006; 71 FR 60662, Oct. 16, 2006; 72 FR 58239, Oct. 12, 2007]

TEST PROCEDURES

§ 431.193 Test procedures for measuring energy consumption of distribution transformers.

The test procedures for measuring the energy efficiency of distribution transformers for purposes of EPCA are specified in appendix A to this subpart.

[71 FR 24997, Apr. 27, 2006]

ENERGY CONSERVATION STANDARDS

§ 431.196 Energy conservation standards and their effective dates.

(a) *Low-Voltage Dry-Type Distribution Transformers.* The efficiency of a low-voltage dry-type distribution transformer manufactured on or after January 1, 2007, shall be no less than that required for their kVA rating in the table below. Low-voltage dry-type distribution transformers with kVA ratings not appearing in the table shall have their minimum efficiency level determined by linear interpolation of the kVA and efficiency values immediately above and below that kVA rating.

Single phase		Three phase	
kVA	Efficiency (%) ¹	kVA	Efficiency (%) ¹
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6
333	98.9	500	98.7
		750	98.8
		1000	98.9

¹ Efficiencies are determined at the following reference conditions: (1) for no-load losses, at the temperature of 20 °C, and (2) for load-losses, at the temperature of 75 °C and 35 percent of nameplate load.

(Source: Table 4–2 of National Electrical Manufacturers Association (NEMA) Standard TP–1–2002, “Guide for Determining Energy Efficiency for Distribution Transformers.”)

(b) *Liquid-Immersed Distribution Transformers.* The efficiency of a liquid-immersed distribution transformer manufactured on or after January 1, 2010, shall be no less than that required for their kVA rating in the table below.

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Liquid-immersed distribution transformers with kVA ratings not appearing in the table shall have their minimum efficiency level determined by

linear interpolation of the kVA and efficiency values immediately above and below that kVA rating.

Single-phase		Three-phase	
kVA	Efficiency (%)	kVA	Efficiency (%)
10	98.62	15	98.36
15	98.76	30	98.62
25	98.91	45	98.76
37.5	99.01	75	98.91
50	99.08	112.5	99.01
75	99.17	150	99.08
100	99.23	225	99.17
167	99.25	300	99.23
250	99.32	500	99.25
333	99.36	750	99.32
500	99.42	1000	99.36
667	99.46	1500	99.42
833	99.49	2000	99.46
	2500	99.49.	

Note: All efficiency values are at 50 percent of nameplate-rated load, determined according to the DOE Test-Procedure. 10 CFR Part 431, Subpart K, Appendix A.

(c) *Medium-Voltage Dry-Type Distribution Transformers.* The efficiency of a medium-voltage dry-type distribution transformer manufactured on or after January 1, 2010, shall be no less than that required for their kVA and BIL rating in the table below. Medium-volt-

age dry-type distribution transformers with kVA ratings not appearing in the table shall have their minimum efficiency level determined by linear interpolation of the kVA and efficiency values immediately above and below that kVA rating.

TABLE I.2—STANDARD LEVELS FOR MEDIUM-VOLTAGE, DRY-TYPE DISTRIBUTION TRANSFORMERS, TABULAR FORM

Single-phase				Three-phase			
BIL kVA	20–45 kV efficiency (%)	46–95 kV efficiency (%)	≥96 kV efficiency (%)	BIL kVA	20–45 kV efficiency (%)	46–95 kV efficiency (%)	≥96 kV efficiency (%)
15	98.10	97.86		15	97.50	97.18	
25	98.33	98.12		30	97.90	97.63	
37.5	98.49	98.30		45	98.10	97.86	
50	98.60	98.42		75	98.33	98.12	
75	98.73	98.57	98.53	112.5	98.49	98.30	
100	98.82	98.67	98.63	150	98.60	98.42	
167	98.96	98.83	98.80	225	98.73	98.57	98.53
250	99.07	98.95	98.91	300	98.82	98.67	98.63
333	99.14	99.03	98.99	500	98.96	98.83	98.80
500	99.22	99.12	99.09	750	99.07	98.95	98.91
667	99.27	99.18	99.15	1000	99.14	99.03	98.99
833	99.31	99.23	99.20	1500	99.22	99.12	99.09
				2000	99.27	99.18	99.15
				2500	99.31	99.23	99.20

Note: BIL means basic impulse insulation level.

Note: All efficiency values are at 50 percent of nameplate rated load, determined according to the DOE Test-Procedure. 10 CFR Part 431, Subpart K, Appendix A.

(d) *Underground Mining Distribution Transformers.* [Reserved]

COMPLIANCE AND ENFORCEMENT

[70 FR 60416, Oct. 18, 2005, as amended at 71 FR 24997, Apr. 27, 2006; 72 FR 58239, Oct. 12, 2007]

SOURCE: 71 FR 24997, Apr. 27, 2006, unless otherwise noted.

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APPENDIX A TO SUBPART K OF PART 431—UNIFORM TEST METHOD FOR MEASURING THE ENERGY CONSUMPTION OF DISTRIBUTION TRANSFORMERS

1.0 DEFINITIONS.

The definitions contained in §§431.2 and 431.192 are applicable to this appendix A.

2.0 ACCURACY REQUIREMENTS.

(a) Equipment and methods for loss measurement shall be sufficiently accurate that measurement error will be limited to the values shown in Table 2.1.

TABLE 2.1—TEST SYSTEM ACCURACY REQUIREMENTS FOR EACH MEASURED QUANTITY

Measured quantity	Test system accuracy
Power Losses	±3.0%
Voltage	±0.5%
Current	±0.5%
Resistance	±0.5%
Temperature	±1.0 °C

(b) Only instrument transformers meeting the 0.3 metering accuracy class, or better, may be used under this test method.

3.0 RESISTANCE MEASUREMENTS

3.1 General Considerations

(a) Measure or establish the winding temperature at the time of the winding resistance measurement.

(b) Measure the direct current resistance (R_{dc}) of transformer windings by one of the methods outlined in section 3.3. The methods of section 3.5 must be used to correct load losses to the applicable reference temperature from the temperature at which they are measured. Observe precautions while taking measurements, such as those in section 3.4, in order to maintain measurement uncertainty limits specified in Table 2.1.

3.2 Temperature Determination of Windings and Pre-conditions for Resistance Measurement.

Make temperature measurements in protected areas where the air temperature is stable and there are no drafts. Determine the winding temperature (T_{dc}) for liquid-immersed and dry-type distribution transformers by the methods described in sections 3.2.1 and 3.2.2, respectively.

3.2.1 Liquid-Immersed Distribution Transformers.

3.2.1.1 Methods

Record the winding temperature (T_{dc}) of liquid-immersed transformers as the average of either of the following:

(a) The measurements from two temperature sensing devices (for example, thermocouples) applied to the outside of the

transformer tank and thermally insulated from the surrounding environment, with one located at the level of the oil and the other located near the tank bottom or at the lower radiator header if applicable; or

(b) The measurements from two temperature sensing devices immersed in the transformer liquid, with one located directly above the winding and other located directly below the winding.

3.2.1.2 Conditions

Make this determination under either of the following conditions:

(a) The windings have been under insulating liquid with no excitation and no current in the windings for four hours before the dc resistance is measured; or

(b) The temperature of the insulating liquid has stabilized, and the difference between the top and bottom temperature does not exceed 5 °C.

3.2.2 Dry-Type Distribution Transformers.

Record the winding temperature (T_{dc}) of dry-type transformers as either of the following:

(a) For ventilated dry-type units, use the average of readings of four or more thermometers, thermocouples, or other suitable temperature sensors inserted within the coils. Place the sensing points of the measuring devices as close as possible to the winding conductors. For sealed units, such as epoxy-coated or epoxy-encapsulated units, use the average of four or more temperature sensors located on the enclosure and/or cover, as close to different parts of the winding assemblies as possible; or

(b) For both ventilated and sealed units, use the ambient temperature of the test area, under the following conditions:

(1) All internal temperatures measured by the internal temperature sensors must not differ from the test area ambient temperature by more than 2 °C.

(2) Enclosure surface temperatures for sealed units must not differ from the test area ambient temperature by more than 2 °C.

(3) Test area ambient temperature should not have changed by more than 3 °C for 3 hours before the test.

(4) Neither voltage nor current has been applied to the unit under test for 24 hours. In addition, increase this initial 24 hour period by any added amount of time necessary for the temperature of the transformer windings to stabilize at the level of the ambient temperature. However, this additional amount of time need not exceed 24 hours.

3.3 Resistance Measurement Methods.

Make resistance measurements using either the resistance bridge method, the voltmeter-ammeter method or a resistance meter. In each instance when this Uniform Test Method is used to test more than one unit of a basic model to determine the efficiency of that basic model, the resistance of

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the units being tested may be determined from making resistance measurements on only one of the units.

3.3.1 Resistance Bridge Methods.

If the resistance bridge method is selected, use either the Wheatstone or Kelvin bridge circuit (or the equivalent of either).

3.3.1.1 Wheatstone Bridge

(a) This bridge is best suited for measuring resistances larger than ten ohms. A schematic diagram of a Wheatstone bridge with a representative transformer under test is shown in Figure 3.1.

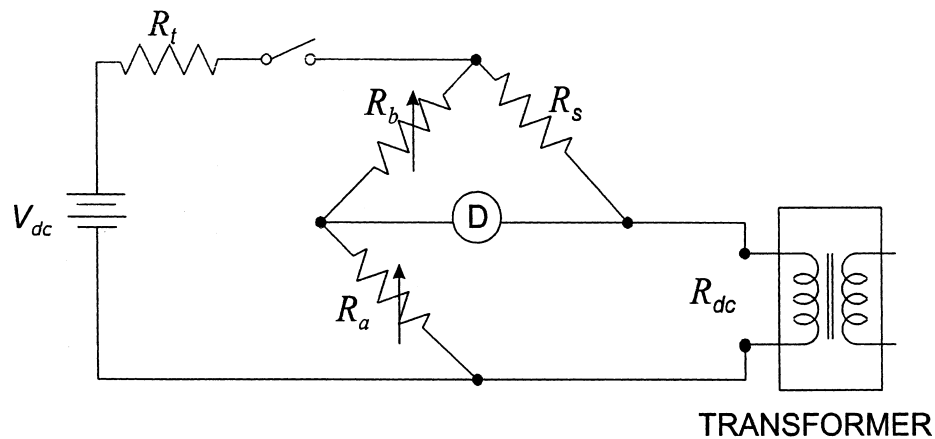


Figure 3.1 Wheatstone Bridge

Where:

R_{dc} is the resistance of the transformer winding being measured,

R_s is a standard resistor having the resistance R_s ,

R_a , R_b are two precision resistors with resistance values R_a and R_b , respectively; at least one resistor must have a provision for resistance adjustment,

R_t is a resistor for reducing the time constant of the circuit,

D is a null detector, which may be either a micro ammeter or microvoltmeter or equivalent instrument for observing that no signal is present when the bridge is balanced, and

V_{dc} is a source of dc voltage for supplying the power to the Wheatstone Bridge.

(b) In the measurement process, turn on the source (V_{dc}), and adjust the resistance ratio (R_a/R_b) to produce zero signal at the detector (D). Determine the winding resistance by using equation 3-1 as follows:

$$R_{dc} = R_s (R_a/R_b) \quad (3-1)$$

3.3.1.2 Kelvin Bridge

(a) This bridge separates the resistance of the connecting conductors to the transformer winding being measured from the resistance of the winding, and therefore is best suited for measuring resistances of ten ohms and smaller. A schematic diagram of a Kelvin bridge with a representative transformer under test is shown in Figure 3.2.

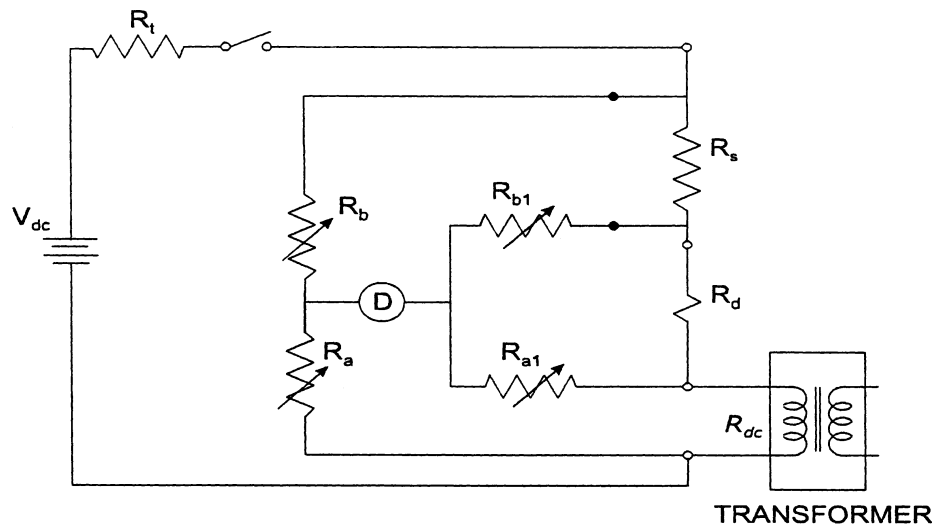


Figure 3.2 Kelvin Bridge

(b) The Kelvin Bridge has seven of the same type of components as in the Wheatstone Bridge. It has two more resistors than the Wheatstone bridge, R_{a1} and R_{b1} . At least one of these resistors must have adjustable resistance. In the measurement process, the source is turned on, two resistance ratios (R_a/R_b) and (R_{a1}/R_{b1}) are adjusted to be equal, and then the two ratios are adjusted together to balance the bridge producing zero signal at the detector. Determine the winding resistance by using equation 3-2 as follows:

$$R_{dc} = R_s (R_a/R_b) \quad (3-2),$$

as with the Wheatstone bridge, with an additional condition that:

$$(R_a/R_b) = (R_{a1}/R_{b1}) \quad (3-3)$$

(c) The Kelvin bridge provides two sets of leads, current-carrying and voltage-sensing, to the transformer terminals and the standard resistor, thus eliminating voltage drops from the measurement in the current-carrying leads as represented by R_d .

3.3.2 Voltmeter-Ammeter Method.

(a) Employ the voltmeter-ammeter method only if the rated current of the winding is greater than one ampere and the test current is limited to 15 percent of the winding current. Connect the transformer winding under test to the circuit shown in Figure 3.3.

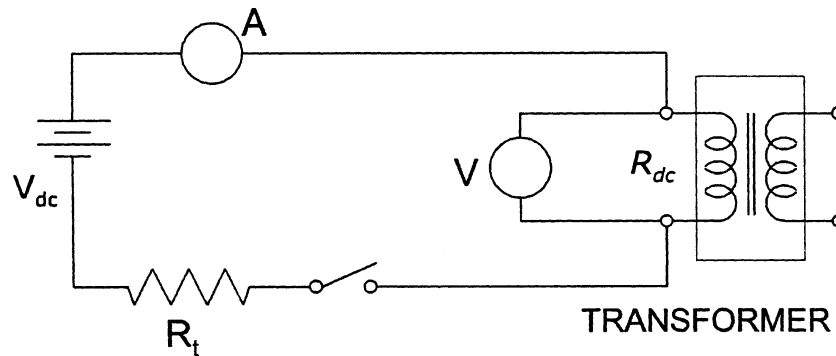


Figure 3.3 Voltmeter-Ammeter Method

Where:

A is an ammeter or a voltmeter-shunt combination for measuring the current (I_{mdc}) in the transformer winding,

V is a voltmeter with sensitivity in the millivolt range for measuring the voltage (V_{mdc}) applied to the transformer winding,

R_{dc} is the resistance of the transformer winding being measured,

R_t is a resistor for reducing the time constant of the circuit, and

V_{dc} is a source of dc voltage for supplying power to the measuring circuit.

(b) To perform the measurement, turn on the source to produce current no larger than 15 percent of the rated current for the winding. Wait until the current and voltage readings have stabilized and then take simultaneous readings of voltage and current. Determine the winding resistance R_{dc} by using equation 3-4 as follows:

$$R_{dc} = (V_{mdc} / I_{mdc}) \quad (3-4)$$

Where:

V_{mdc} is the voltage measured by the voltmeter V, and

I_{mdc} is the current measured by the ammeter A.

(c) As shown in Figure 3.3, separate current and voltage leads must be brought to the transformer terminals. (This eliminates the errors due to lead and contact resistance.)

3.3.3 Resistance Meters.

Resistance meters may be based on voltmeter-ammeter, or resistance bridge, or some other operating principle. Any meter used to measure a transformer's winding resistance must have specifications for resistance range, current range, and ability to measure highly inductive resistors that

cover the characteristics of the transformer being tested. Also the meter's specifications for accuracy must meet the applicable criteria of Table 2.1 in section 2.0.

3.4 Precautions in Measuring Winding Resistance.

3.4.1 Required actions.

The following guidelines must be observed when making resistance measurements:

(a) Use separate current and voltage leads when measuring small (< 10 ohms) resistance.

(b) Use null detectors in bridge circuits, and measuring instruments in voltmeter-ammeter circuits, that have sensitivity and resolution sufficient to enable observation of at least 0.1 percent change in the measured resistance.

(c) Maintain the dc test current at or below 15 percent of the rated winding current.

(d) Inclusion of a stabilizing resistor R_t (see section 3.4.2) will require higher source voltage.

(e) Disconnect the null detector (if a bridge circuit is used) and voltmeter from the circuit before the current is switched off, and switch off current by a suitable insulated switch.

3.4.2 Guideline for Time Constant.

(a) The following guideline is suggested for the tester as a means to facilitate the measurement of resistance in accordance with the accuracy requirements of section 2.0:

(b) The accurate reading of resistance R_{dc} may be facilitated by shortening the time constant. This is done by introducing a resistor R_t in series with the winding under test in both the bridge and voltmeter-ammeter circuits as shown in Figures 3.1 to 3.3. The relationship for the time constant is:

$$T_c = (L_{tc}/R_{tc}) \quad (3-5)$$

Where:

T_c is the time constant in seconds,

L_{tc} is the total magnetizing and leakage inductance of the winding under test, in henries, and

R_{tc} is the total resistance in ohms, consisting of R_t in series with the winding resistance R_{dc} and the resistance R_s of the standard resistor in the bridge circuit.

(c) Because R_{tc} is in the denominator of the expression for the time constant, increasing the resistance R_{tc} will decrease the time constant. If the time constant in a given test circuit is too long for the resistance readings to be stable, then a higher resistance can be substituted for the existing R_{tc} , and successive replacements can be made until adequate stability is reached.

3.5 Conversion of Resistance Measurements.

(a) Resistance measurements must be corrected, from the temperature at which the winding resistance measurements were made, to the reference temperature. As specified in these test procedures, the reference temperature for liquid-immersed transformers loaded at 50 percent of the rated load is 55 °C. For medium-voltage, dry-type transformers loaded at 50 percent of the rated load, and for low-voltage, dry-type transformers loaded at 35 percent of the rated load, the reference temperature is 75 °C.

(b) Correct the measured resistance to the resistance at the reference temperature using equation 3-6 as follows:

$$R_{ts} = R_{dc} [(T_s + T_k)/(T_{dc} + T_k)] \quad (3-6)$$

Where:

R_{ts} is the resistance at the reference temperature, T_s ,

R_{dc} is the measured resistance at temperature, T_{dc} ,

T_s is the reference temperature in °C,

T_{dc} is the temperature at which resistance was measured in °C, and

T_k is 234.5 °C for copper or 225 °C for aluminum.

4.0 LOSS MEASUREMENT

4.1 General Considerations.

The efficiency of a transformer is computed from the total transformer losses, which are determined from the measured value of the no-load loss and load loss power components. Each of these two power loss components is measured separately using test sets that are identical, except that shorting straps are added for the load-loss test. The measured quantities will need correction for instrumentation losses and may

need corrections for known phase angle errors in measuring equipment and for the waveform distortion in the test voltage. Any power loss not measured at the applicable reference temperature must be adjusted to that reference temperature. The measured load loss must also be adjusted to a specified output loading level if not measured at the specified output loading level. Test distribution transformers designed for harmonic currents using a sinusoidal waveform ($k=1$).

4.2 Measurement of Power Losses.

4.2.1 No-Load Loss.

Measure the no-load loss and apply corrections as described in section 4.4, using the appropriate test set as described in section 4.3.

4.2.2 Load Loss.

Measure the load loss and apply corrections as described in section 4.5, using the appropriate test set as described in section 4.3.

4.3 Test Sets.

(a) The same test set may be used for both the no-load loss and load loss measurements provided the range of the test set encompasses the test requirements of both tests. Calibrate the test set to national standards to meet the tolerances in Table 2.1 in section 2.0. In addition, the wattmeter, current measuring system and voltage measuring system must be calibrated separately if the overall test set calibration is outside the tolerance as specified in section 2.0 or the individual phase angle error exceeds the values specified in section 4.5.3.

(b) A test set based on the wattmeter-voltmeter-ammeter principle may be used to measure the power loss and the applied voltage and current of a transformer where the transformer's test current and voltage are within the measurement capability of the measuring instruments. Current and voltage transformers, known collectively as instrument transformers, or other scaling devices such as resistive or capacitive dividers for voltage, may be used in the above circumstance, and must be used together with instruments to measure current, voltage, or power where the current or voltage of the transformer under test exceeds the measurement capability of such instruments. Thus, a test set may include a combination of measuring instruments and instrument transformers (or other scaling devices), so long as the current or voltage of the transformer under test does not exceed the measurement capability of any of the instruments.

4.3.1 Single-Phase Test Sets.

Use these for testing single-phase distribution transformers.

4.3.1.1 Without Instrument Transformers.

(a) A single-phase test set without an instrument transformer is shown in Figure 4.1.

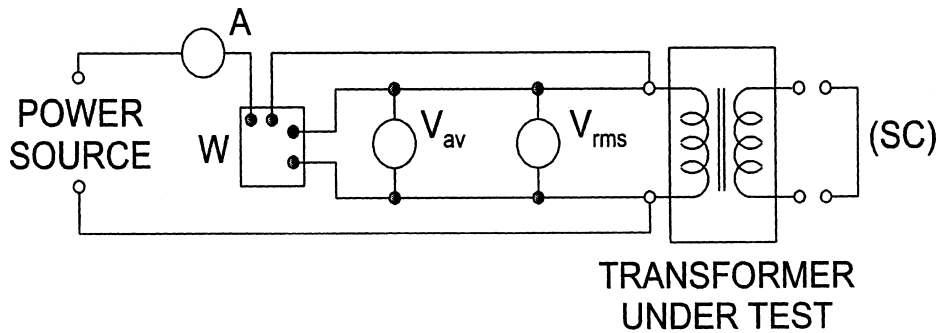


Figure 4.1 Single-Phase Test Set Without Instrument Transformers

Where:

W is a wattmeter used to measure P_{nm} and P_{lm} , the no-load and load loss power, respectively,

V_{rms} is a true root-mean-square (rms) voltmeter used to measure $V_{r(nm)}$ and V_{lm} , the rms test voltages in no-load and load loss measurements, respectively,

V_{av} is an average sensing voltmeter, calibrated to indicate rms voltage for sinusoidal waveforms and used to measure $V_{a(nm)}$, the average voltage in no-load loss measurements,

A is an rms ammeter used to measure test current, especially I_{lm} , the load loss current, and

(SC) is a conductor for providing a short-circuit across the output windings for the load loss measurements.

(b) Either the primary or the secondary winding can be connected to the test set. However, more compatible voltage and current levels for the measuring instruments are available if for no-load loss measurements the secondary (low voltage) winding is connected to the test set, and for load loss measurements the primary winding is connected to the test set. Use the average-sensing voltmeter, V_{av} , only in no-load loss measurements.

4.3.1.2 With Instrument Transformers.

A single-phase test set with instrument transformers is shown in Figure 4.2. This circuit has the same four measuring instruments as that in Figure 4.1. The current and voltage transformers, designated as (CT) and (VT), respectively, are added.

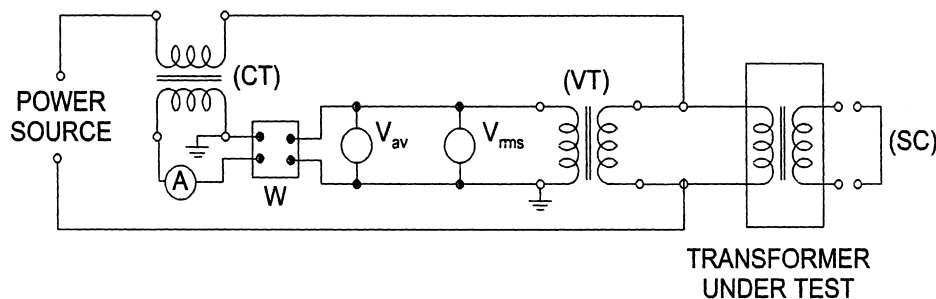


Figure 4.2 Single-Phase Test Set With Instrument Transformers

4.3.2 Three-Phase Test Sets.

Use these for testing three-phase distribution transformers. Use in a four-wire, three-wattmeter test circuit.

4.3.2.1 Without Instrument Transformers.

(a) A three-phase test set without instrument transformers is shown in Figure 4.3. This test set is essentially the same circuit

shown in Figure 4.1 repeated three times, and the instruments are individual devices as shown. As an alternative, the entire in-

strumentation system of a three-phase test set without transformers may consist of a multi-function analyzer.

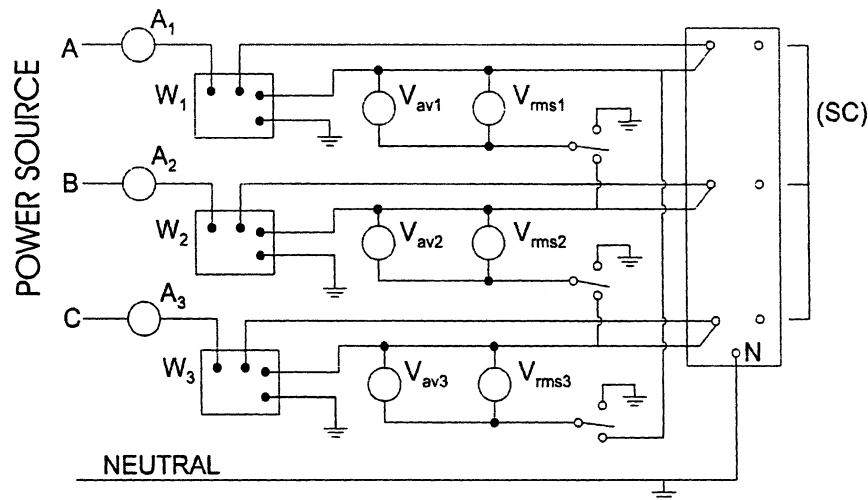


Figure 4.3 Three-Phase Test Set Without Instrument Transformers

(b) Either group of windings, the primary or the secondary, can be connected in wye or delta configuration. If both groups of windings are connected in the wye configuration for the no-load test, the neutral of the winding connected to the test set must be connected to the neutral of the source to provide a return path for the neutral current.

(c) In the no-load loss measurement, the voltage on the winding must be measured. Therefore a provision must be made to switch the voltmeters for line-to-neutral measurements for wye-connected windings

and for line-to-line measurements for delta-connected windings.

4.3.2.2 With Instrument Transformers.

A three-phase test set with instrument transformers is shown in Figure 4.4. This test set is essentially the same circuit shown in Figure 4.2 repeated three times. Provision must be made to switch the voltmeters for line-to-neutral and line-to-line measurements as in section 4.3.2.1. The voltage sensors ("coils") of the wattmeters must always be connected in the line-to-neutral configuration.

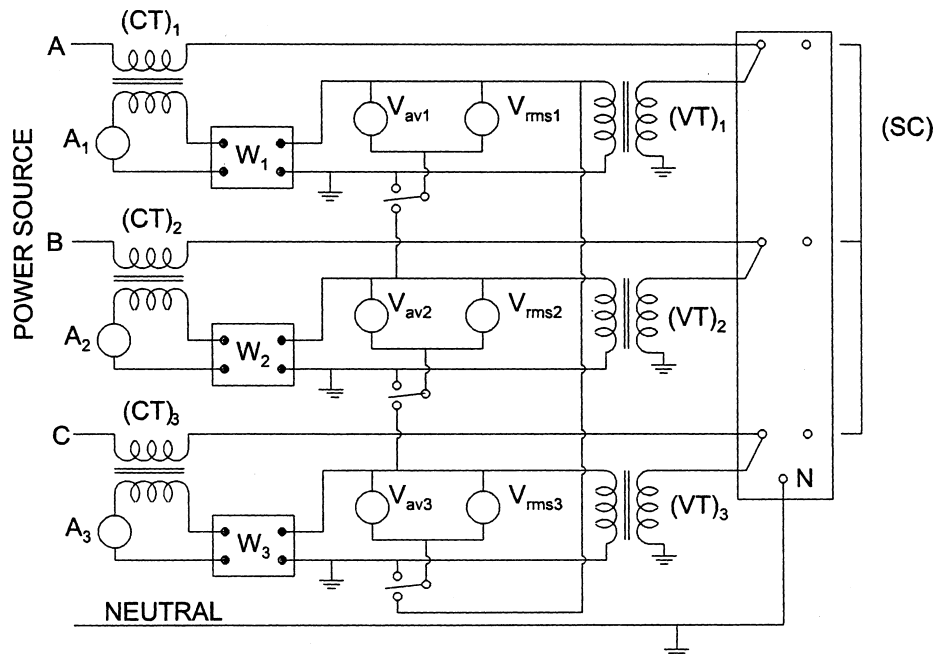


Figure 4.4 Three-Phase Test Set with Instrument Transformers

4.3.2.3 Test Set Neutrals.

If the power source in the test circuit is wye-connected, ground the neutral. If the power source in the test circuit is delta-connected, use a grounding transformer to obtain neutral and ground for the test.

4.4 No-Load Losses: Measurement and Calculations.

4.4.1 General Considerations.

Measurement corrections are permitted but not required for instrumentation losses and for losses from auxiliary devices. Measurement corrections are required:

- When the waveform of the applied voltage is non-sinusoidal; and
- When the core temperature or liquid temperature is outside the $20\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$ range.

4.4.2 No-Load Loss Test.

(a) The purpose of the no-load loss test is to measure no-load losses at a specified excitation voltage and a specified frequency. The no-load loss determination must be based on a sine-wave voltage corrected to the reference temperature. Connect either of the transformer windings, primary or secondary, to the appropriate test set of Figures 4.1 to 4.4, giving consideration to section 4.4.2(a)(2). Leave the unconnected winding(s) open circuited. Apply the rated voltage at rated frequency, as measured by the average-sensing voltmeter, to the transformer. Take the

readings of the wattmeter(s) and the average-sensing and true rms voltmeters. Observe the following precautions:

- (1) Voltmeter connections. When correcting to a sine-wave basis using the average-voltmeter method, the voltmeter connections must be such that the waveform applied to the voltmeters is the same as the waveform across the energized windings.
- (2) Energized windings. Energize either the high voltage or the low voltage winding of the transformer under test.
- (3) Voltage and frequency. The no-load loss test must be conducted with rated voltage impressed across the transformer terminals using a voltage source at a frequency equal to the rated frequency of the transformer under test.

(b) Adjust the voltage to the specified value as indicated by the average-sensing voltmeter. Record the values of rms voltage, rms current, electrical power, and average voltage as close to simultaneously as possible. For a three-phase transformer, take all of the readings on one phase before proceeding to the next, and record the average of the three rms voltmeter readings as the rms voltage value.

NOTE: When the tester uses a power supply that is not synchronized with an electric utility grid, such as a dc/ac motor-generator

set, check the frequency and maintain it within ± 0.5 percent of the rated frequency of the transformer under test. A power source that is directly connected to, or synchronized with, an electric utility grid need not be monitored for frequency.

4.4.3 Corrections.

4.4.3.1 Correction for Instrumentation Losses.

Measured losses attributable to the voltmeters and wattmeter voltage circuit, and to voltage transformers if they are used, may be deducted from the total no-load losses measured during testing.

4.4.3.2 Correction for Non-Sinusoidal Applied Voltage.

(a) The measured value of no-load loss must be corrected to a sinusoidal voltage, except when waveform distortion in the test voltage causes the magnitude of the correction to be less than 1 percent. In such a case, no correction is required.

(b) To make a correction where the distortion requires a correction of 5 percent or less, use equation 4-1. If the distortion requires a correction to be greater than 5 percent, improve the test voltage and re-test. Repeat until the distortion requires a correction of 5 percent or less.

(c) Determine the no-load losses of the transformer corrected for sine-wave basis from the measured value by using equation 4-1 as follows:

$$P_{nc} = \frac{P_{nm}}{P_1 + kP_2} \quad (4-1)$$

Where:

P_{nc} is the no-load loss corrected to a sine-wave basis at the temperature (T_{nr}) at which no-load loss is measured,

P_{nm} is the measured no-load loss at temperature T_{nm} ,

P_1 is the per unit hysteresis loss,

P_2 is the per unit eddy-current loss,

$P_1 + P_2 = 1$,

$$k = \left(\frac{V_{r(nm)}}{V_{a(nm)}} \right)^2,$$

$V_{r(nm)}$ is the test voltage measured by rms voltmeter, and

$V_{a(nm)}$ is the test voltage measured by average-voltage voltmeter.

(d) The two loss components (P_1 and P_2) are assumed equal in value, each assigned a value of 0.5 per unit, unless the actual measurement-based values of hysteresis and eddy-current losses are available (in per unit form), in which case the actual measurements apply.

4.4.3.3 Correction of No-Load Loss to Reference Temperature.

After correcting the measured no-load loss for waveform distortion, correct the loss to the reference temperature of 20 °C. If the no-load loss measurements were made between 10 °C and 30 °C, this correction is not required. If the correction to reference temperature is applied, then the core temperature of the transformer during no-load loss measurement (T_{nm}) must be determined within ± 10 °C of the true average core temperature. Correct the no-load loss to the reference temperature by using equation 4-2 as follows:

$$P_{nc} = P_{ncl} \left[1 + 0.00065(T_{nm} - T_{nr}) \right] \quad (4-2)$$

Where:

P_{nc} is the no-load losses corrected for waveform distortion and then to the reference temperature of 20 °C,

P_{ncl} is the no-load losses, corrected for waveform distortion, at temperature T_{nm} ,

T_{nm} is the core temperature during the measurement of no-load losses, and

T_{nr} is the reference temperature, 20 °C.

4.5 Load Losses: Measurement and Calculations.

4.5.1 General Considerations.

(a) The load losses of a transformer are those losses incident to a specified load carried by the transformer. Load losses consist of ohmic loss in the windings due to the load current and stray losses due to the eddy currents induced by the leakage flux in the windings, core clamps, magnetic shields, tank walls, and other conducting parts. The ohmic loss of a transformer varies directly with temperature, whereas the stray losses vary inversely with temperature.

(b) For a transformer with a tap changer, conduct the test at the rated current and rated-voltage tap position. For a transformer that has a configuration of windings which allows for more than one nominal rated voltage, determine its load losses either in the winding configuration in which the highest losses occur or in each winding configuration in which the transformer can operate.

4.5.2 Tests for Measuring Load Losses.

(a) Connect the transformer with either the high-voltage or low-voltage windings to the appropriate test set. Then short-circuit the winding that was not connected to the test set. Apply a voltage at the rated frequency (of the transformer under test) to the connected windings to produce the rated current in the transformer. Take the readings of the wattmeter(s), the ammeters(s), and rms voltmeter(s).

(b) Regardless of the test set selected, the following preparatory requirements must be satisfied for accurate test results:

(1) Determine the temperature of the windings using the applicable method in section 3.2.1 or section 3.2.2.

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(2) The conductors used to short-circuit the windings must have a cross-sectional area equal to, or greater than, the corresponding transformer leads, or, if the tester uses a different method to short-circuit the windings, the losses in the short-circuiting conductor assembly must be less than 10 percent of the transformer's load losses.

(3) When the tester uses a power supply that is not synchronized with an electric utility grid, such as a dc/ac motor-generator set, follow the provisions of the "Note" in section 4.4.2.

4.5.3 Corrections.

4.5.3.1 Correction for Losses from Instrumentation and Auxiliary Devices.

4.5.3.1.1 Instrumentation Losses.

Measured losses attributable to the voltmeters, wattmeter voltage circuit and short-circuiting conductor (SC), and to the voltage transformers if they are used, may be deducted from the total load losses measured during testing.

4.5.3.1.2 Losses from Auxiliary Devices.

Measured losses attributable to auxiliary devices (e.g., circuit breakers, fuses, switches) installed in the transformer, if any, that are not part of the winding and core assembly, may be excluded from load losses measured during testing. To exclude these losses, either (1) measure transformer losses without the auxiliary devices by removing or bypassing them, or (2) measure transformer

losses with the auxiliary devices connected, determine the losses associated with the auxiliary devices, and deduct these losses from the load losses measured during testing.

4.5.3.2 Correction for Phase Angle Errors.

(a) Corrections for phase angle errors are not required if the instrumentation is calibrated over the entire range of power factors and phase angle errors. Otherwise, determine whether to correct for phase angle errors from the magnitude of the normalized per unit correction, β_n , obtained by using equation 4-3 as follows:

$$\beta_n = \frac{V_{lm} I_{lm} (\beta_w - \beta_v + \beta_c) \sin \phi}{P_{lm}} \quad (4-3)$$

(b) The correction must be applied if β_n is outside the limits of ± 0.01 . If β_n is within the limits of ± 0.01 , the correction is permitted but not required.

(c) If the correction for phase angle errors is to be applied, first examine the total system phase angle ($\beta_w - \beta_v + \beta_c$). Where the total system phase angle is equal to or less than ± 12 milliradians (± 41 minutes), use either equation 4-4 or 4-5 to correct the measured load loss power for phase angle errors, and where the total system phase angle exceeds ± 12 milliradians (± 41 minutes) use equation 4-5, as follows:

$$P_{cl} = P_{lm} - V_{lm} I_{lm} (\beta_w - \beta_v + \beta_c) \sin \phi \quad (4-4)$$

$$P_{cl} = V_{lm} I_{lm} \cos(\phi + \beta_w - \beta_v + \beta_c) \quad (4-5)$$

(d) The symbols in this section (4.5.3.2) have the following meanings:

P_{cl} is the corrected wattmeter reading for phase angle errors,

P_{lm} is the actual wattmeter reading,

V_{lm} is the measured voltage at the transformer winding,

I_{lm} is the measured rms current in the transformer winding,

$$\phi = \cos^{-1} \frac{P_{lm}}{V_{lm} I_{lm}}$$

is the measured phase angle between V_{lm} and I_{lm} ,

β_w is the phase angle error (in radians) of the wattmeter; the error is positive if the phase angle between the voltage and current phasors as sensed by the wattmeter is smaller than the true phase angle,

thus effectively increasing the measured power,

β_v is the phase angle error (in radians) of the voltage transformer; the error is positive if the secondary voltage leads the primary voltage, and

β_c is the phase angle error (in radians) of the current transformer; the error is positive if the secondary current leads the primary current.

(e) The instrumentation phase angle errors used in the correction equations must be specific for the test conditions involved.

4.5.3.3 Temperature Correction of Load Loss.

(a) When the measurement of load loss is made at a temperature T_{lm} that is different from the reference temperature, use the procedure summarized in the equations 4-6 to 4-10 to correct the measured load loss to the reference temperature. The symbols used in these equations are defined at the end of this section.

(b) Calculate the ohmic loss (P_e) by using equation 4-6 as follows:

$$\begin{aligned}
P_e &= P_{e(p)} + P_{e(s)} \\
&= I_{lm(p)}^2 R_{dc(p)} \frac{T_{k(p)} + T_{lm}}{T_{k(p)} + T_{dc}} + I_{lm(s)}^2 R_{dc(s)} \frac{T_{k(s)} + T_{lm}}{T_{k(s)} + T_{dc}} \\
&= I_{lm(p)}^2 \left[R_{dc(p)} \frac{T_{k(p)} + T_{lm}}{T_{k(p)} + T_{dc}} + \left[\frac{N_1}{N_2} \right]^2 R_{dc(s)} \frac{T_{k(s)} + T_{lm}}{T_{k(s)} + T_{dc}} \right] \quad (4-6)
\end{aligned}$$

(c) Obtain the stray loss by subtracting the calculated ohmic loss from the measured load loss, by using equation 4-7 as follows:

$$P_s = P_{lc1} - P_e \quad (4-7)$$

(d) Correct the ohmic and stray losses to the reference temperature for the load loss by using equations 4-8 and 4-9, respectively, as follows:

$$\begin{aligned}
P_{er} &= P_{e(p)} \frac{T_{k(p)} + T_{lr}}{T_{k(p)} + T_{lm}} + P_{e(s)} \frac{T_{k(s)} + T_{lr}}{T_{k(s)} + T_{lm}} \\
&= I_{lm(p)}^2 \left[R_{dc(p)} \frac{T_{k(p)} + T_{lr}}{T_{k(p)} + T_{dc}} + \left[\frac{N_1}{N_2} \right]^2 R_{dc(s)} \frac{T_{k(s)} + T_{lr}}{T_{k(s)} + T_{dc}} \right] \quad (4-8)
\end{aligned}$$

$$P_{sr} = (P_{lc1} - P_e) \frac{T_k + T_{lm}}{T_k + T_{lr}} \quad (4-9)$$

(e) Add the ohmic and stray losses, corrected to the reference temperature, to give the load loss, P_{lc2} , at the reference temperature, by using equation 4-10 as follows:

$$\begin{aligned}
P_{lc2} &= P_{er} + P_{sr} \\
&= I_{lm(p)}^2 \left[R_{dc(p)} \frac{T_{k(p)} + T_{lr}}{T_{k(p)} + T_{dc}} + \left[\frac{N_1}{N_2} \right]^2 R_{dc(s)} \frac{T_{k(s)} + T_{lr}}{T_{k(s)} + T_{dc}} \right] \\
&\quad + \left[P_{lc1} - I_{lm(p)}^2 \left[R_{dc(p)} \frac{T_{k(p)} + T_{lm}}{T_{k(p)} + T_{dc}} + \left[\frac{N_1}{N_2} \right]^2 R_{dc(s)} \frac{T_{k(s)} + T_{lm}}{T_{k(s)} + T_{dc}} \right] \right] \frac{T_k + T_{lm}}{T_k + T_{lr}} \quad (4-10)
\end{aligned}$$

(f) The symbols in this section (4.5.3.3) have the following meanings:

$I_{lm(p)}$ is the primary current in amperes,
 $I_{lm(s)}$ is the secondary current in amperes,

P_e is the ohmic loss in the transformer in watts at the temperature T_{lm} .

$P_{e(p)}$ is the ohmic loss in watts in the primary winding at the temperature T_{lm} .

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$P_{e(s)}$ is the ohmic loss in watts in the secondary winding at the temperature T_{lm} .

P_{er} is the ohmic loss in watts corrected to the reference temperature,

P_{lc1} is the measured load loss in watts, corrected for phase angle error, at the temperature T_{lm} .

P_{lc2} is the load loss at the reference temperature,

P_s is the stray loss in watts at the temperature T_{lm} .

P_{sr} is the stray loss in watts corrected to the reference temperature,

$R_{dc(p)}$ is the measured dc primary winding resistance in ohms,

$R_{dc(s)}$ is the measured dc secondary winding resistance in ohms,

T_k is the critical temperature in degrees Celsius for the material of the transformer windings. Where copper is used in both primary and secondary windings, T_k is 234.5 °C; where aluminum is used in both primary and secondary windings, T_k is 225 °C; where both copper and aluminum are used in the same transformer, the value of 229 °C is used for T_k ,

$T_{k(p)}$ is the critical temperature in degrees Celsius for the material of the primary winding: 234.5 °C if copper and 225 °C if aluminum,

$T_{k(s)}$ is the critical temperature in degrees Celsius for the material of the secondary winding: 234.5 °C if copper and 225 °C if aluminum,

T_{lm} is the temperature in degrees Celsius at which the load loss is measured,

T_{lr} is the reference temperature for the load loss in degrees Celsius,

T_{dc} is the temperature in degrees Celsius at which the resistance values are measured, and

N_1/N_2 is the ratio of the number of turns in the primary winding (N_1) to the number of turns in the secondary winding (N_2); for a primary winding with taps, N_1 is the number of turns used when the voltage applied to the primary winding is the rated primary voltage.

5.0 DETERMINING THE EFFICIENCY VALUE OF THE TRANSFORMER

This section presents the equations to use in determining the efficiency value of the transformer at the required reference conditions and at the specified loading level. The details of measurements are described in sections 3.0 and 4.0. For a transformer that has a configuration of windings which allows for more than one nominal rated voltage, determine its efficiency either at the voltage at which the highest losses occur or at each voltage at which the transformer is rated to operate.

5.1 Output Loading Level Adjustment.

If the output loading level for energy efficiency is different from the level at which

the load loss power measurements were made, then adjust the corrected load loss power, P_{lc2} , by using equation 5-1 as follows:

$$P_{lc} = P_{lc2} \left[\frac{P_{os}}{P_{or}} \right]^2 = P_{lc2} L^2 \quad (5-1)$$

Where:

P_{lc} is the adjusted load loss power to the specified energy efficiency load level,

P_{lc2} is as calculated in section 4.5.3.3,

P_{or} is the rated transformer apparent power (name plate),

P_{os} is the specified energy efficiency load level, where $P_{os} = P_{or}L$, and

L is the per unit load level, e.g., if the load level is 50 percent then "L" will be 0.5.

5.2 Total Loss Power Calculation.

Calculate the corrected total loss power by using equation 5-2 as follows:

$$P_{ts} = P_{nc} + P_{lc} \quad (5-2)$$

Where:

P_{ts} is the corrected total loss power adjusted for the transformer output loading specified by the standard,

P_{nc} is as calculated in section 4.4.3.3, and

P_{lc} is as calculated in section 5.1.

5.3 Energy Efficiency Calculation.

Calculate efficiency (η) in percent at specified energy efficiency load level, P_{os} , by using equation 5-3 as follows:

$$\eta = 100 \left(\frac{P_{os}}{P_{os} + P_{ts}} \right) \quad (5-3)$$

Where:

P_{os} is as described and calculated in section 5.1, and

P_{ts} is as described and calculated in section 5.2.

5.4 Significant Figures in Power Loss and Efficiency Data.

In measured and calculated data, retain enough significant figures to provide at least 1 percent resolution in power loss data and 0.01 percent resolution in efficiency data.

6.0 TEST EQUIPMENT CALIBRATION AND CERTIFICATION

Maintain and calibrate test equipment and measuring instruments, maintain calibration records, and perform other test and measurement quality assurance procedures according to the following sections. The calibration of the test set must confirm the accuracy of the test set to that specified in section 2.0, Table 2.1.

6.1 Test Equipment.

The party performing the tests shall control, calibrate and maintain measuring and test equipment, whether or not it owns the

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equipment, has the equipment on loan, or the equipment is provided by another party. Equipment shall be used in a manner which assures that measurement uncertainty is known and is consistent with the required measurement capability.

6.2 Calibration and Certification.

The party performing the tests must:

(a) Identify the measurements to be made, the accuracy required (section 2.0) and select the appropriate measurement and test equipment;

(b) At prescribed intervals, or prior to use, identify, check and calibrate, if needed, all measuring and test equipment systems or devices that affect test accuracy, against certified equipment having a known valid relationship to nationally recognized standards; where no such standards exist, the basis used for calibration must be documented;

(c) Establish, document and maintain calibration procedures, including details of equipment type, identification number, location, frequency of checks, check method, acceptance criteria and action to be taken when results are unsatisfactory;

(d) Ensure that the measuring and test equipment is capable of the accuracy and precision necessary, taking into account the voltage, current and power factor of the transformer under test;

(e) Identify measuring and test equipment with a suitable indicator or approved identification record to show the calibration status;

(f) Maintain calibration records for measuring and test equipment;

(g) Assess and document the validity of previous test results when measuring and test equipment is found to be out of calibration;

(h) Ensure that the environmental conditions are suitable for the calibrations, measurements and tests being carried out;

(i) Ensure that the handling, preservation and storage of measuring and test equipment is such that the accuracy and fitness for use is maintained; and

(j) Safeguard measuring and test facilities, including both test hardware and test software, from adjustments which would invalidate the calibration setting.

[71 FR 24999, Apr. 27, 2006, as amended at 71 FR 60662, Oct. 16, 2006]

EFFECTIVE DATE NOTE: At 71 FR 24999, Apr. 27, 2006, appendix A to subpart K of part 431 was added, effective May 30, 2006, except for section 6.2(f) and section 6.2 (b) and (c) which contain information collection requirements and will not become effective until approval has been given by the Office of Management and Budget.

10 CFR Ch. II (1–1–13 Edition)

Subpart L—Illuminated Exit Signs

SOURCE: 70 FR 60417, Oct. 18, 2005, unless otherwise noted.

§ 431.201 Purpose and scope.

This subpart contains energy conservation requirements for illuminated exit signs, pursuant to Part B of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6291–6309.

§ 431.202 Definitions concerning illuminated exit signs.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Face means an illuminated side of an illuminated exit sign.

Illuminated exit sign means a sign that—

(1) Is designed to be permanently fixed in place to identify an exit; and

(2) Consists of an electrically powered integral light source that—

(i) Illuminates the legend “EXIT” and any directional indicators; and

(ii) Provides contrast between the legend, any directional indicators, and the background.

Input power demand means the amount of power required to continuously illuminate an exit sign model, measured in watts (W). For exit sign models with rechargeable batteries, input power demand shall be measured with batteries at full charge.

[70 FR 60417, Oct. 18, 2005, as amended at 71 FR 71372, Dec. 8, 2006; 76 FR 12504, Mar. 7, 2011]

TEST PROCEDURES

§ 431.203 Materials incorporated by reference.

(a) *General.* The Department incorporates by reference the following test procedures into subpart L of part 431. The Director of the Federal Register has approved the material listed in

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paragraph (b) of this section for incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to this material by the standard-setting organization will not affect the DOE test procedures unless and until DOE amends its test procedures. The Department incorporates the material as it exists on the date of the approval by the Federal Register and a notice of any change in the material will be published in the FEDERAL REGISTER.

(b) *Test procedure incorporated by reference.* Environmental Protection Agency “ENERGY STAR Program Requirements for Exit Signs,” Version 2.0 issued January 1, 1999.

(c) *Availability of reference—(1) Inspection of test procedure.* The test procedure incorporated by reference are available for inspection at:

(i) National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(ii) U.S. Department of Energy, Forrestal Building, Room 1J-018 (Resource Room of the Building Technologies Program), 1000 Independence Avenue, SW., Washington, DC 20585-0121, (202) 586-9127, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

(2) *Obtaining copies of the standard.* Copies of the Environmental Protection Agency “ENERGY STAR Program Requirements for Exit Signs,” Version 2.0, may be obtained from the Environmental Protection Agency, Ariel Rios Building, 1200 Pennsylvania Avenue, NW., Washington, DC 20460, (202) 272-0167 or at <http://www.epa.gov>.

[71 FR 71373, Dec. 8, 2006]

§ 431.204 Uniform test method for the measurement of energy consumption of illuminated exit signs.

(a) *Scope.* This section provides the test procedure for measuring, pursuant to EPCA, the input power demand of illuminated exit signs. For purposes of this part 431 and EPCA, the test procedure for measuring the input power demand of illuminated exit signs shall be

the test procedure specified in § 431.203(b).

(b) *Testing and Calculations.* Determine the energy efficiency of each covered product by conducting the test procedure, set forth in the Environmental Protection Agency’s “ENERGY STAR Program Requirements for Exit Signs,” Version 2.0, section 4 (Test Criteria), “Conditions for testing” and “Input power measurement.” (Incorporated by reference, see § 431.203)

[71 FR 71373, Dec. 8, 2006]

ENERGY CONSERVATION STANDARDS

§ 431.206 Energy conservation standards and their effective dates.

An illuminated exit sign manufactured on or after January 1, 2006, shall have an input power demand of 5 watts or less per face.

Subpart M—Traffic Signal Modules and Pedestrian Modules

SOURCE: 70 FR 60417, Oct. 18, 2005, unless otherwise noted.

§ 431.221 Purpose and scope.

This subpart contains energy conservation requirements for traffic signal modules and pedestrian modules, pursuant to Part B of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6291-6309.

§ 431.222 Definitions concerning traffic signal modules and pedestrian modules.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Maximum wattage means the power consumed by the module after being operated for 60 minutes while mounted in a temperature testing chamber so that the lensed portion of the module is outside the chamber, all portions of the module behind the lens are within the chamber at a temperature of 74 °C and the air temperature in front of the

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lens is maintained at a minimum of 49 °C.

Nominal wattage means the power consumed by the module when it is operated within a chamber at a temperature of 25 °C after the signal has been operated for 60 minutes.

Pedestrian module means a light signal used to convey movement information to pedestrians.

Traffic signal module means a standard 8-inch (200 mm) or 12-inch (300 mm) traffic signal indication that—

(1) Consists of a light source, a lens, and all other parts necessary for operation; and

(2) Communicates movement messages to drivers through red, amber, and green colors.

[70 FR 60417, Oct. 18, 2005, as amended at 71 FR 71373, Dec. 8, 2006; 76 FR 12504, Mar. 7, 2011]

TEST PROCEDURES

§ 431.223 Materials incorporated by reference.

(a) *General.* The Department incorporates by reference the following test procedures into subpart M of part 431. The Director of the Federal Register has approved the material listed in paragraph (b) of this section for incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to this material by the standard-setting organization will not affect the DOE test procedures unless and until DOE amends its test procedures. The Department incorporates the material as it exists on the date of the approval by the Federal Register and a notice of any change in the material will be published in the FEDERAL REGISTER.

(b) *List of test procedures incorporated by reference.* (1) Environmental Protection Agency, “ENERGY STAR Program Requirements for Traffic Signals,” Version 1.1 issued February 4, 2003.

(2) Institute of Transportation Engineers (ITE), “Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement,” June 27, 2005.

(c) *Availability of references*—(1) *Inspection of test procedures.* The test pro-

cedures incorporated by reference are available for inspection at:

(i) National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030, or go to:

http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(ii) U.S. Department of Energy, Forrestal Building, Room 1J-018 (Resource Room of the Building Technologies Program), 1000 Independence Avenue, SW., Washington, DC 20585-0121, (202) 586-9127, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

(2) *Obtaining copies of standards.* Standards incorporated by reference may be obtained from the following sources:

(i) Copies of the Environmental Protection Agency “ENERGY STAR Program Requirements for Traffic Signals,” Version 1.1, may be obtained from the Environmental Protection Agency, Ariel Rios Building, 1200 Pennsylvania Avenue, NW., Washington, DC 20460, (202) 272-0167 or at <http://www.epa.gov>.

(ii) Institute of Transportation Engineers, 1099 14th Street, NW., Suite 300 West, Washington, DC 20005-3438, (202) 289-0222, or ite_staff@ite.org.

[71 FR 71373, Dec. 8, 2006]

§ 431.224 Uniform test method for the measurement of energy consumption for traffic signal modules and pedestrian modules.

(a) *Scope.* This section provides the test procedures for measuring, pursuant to EPCA, the maximum wattage and nominal wattage of traffic signal modules and pedestrian modules. For purposes of 10 CFR part 431 and EPCA, the test procedures for measuring the maximum wattage and nominal wattage of traffic signal modules and pedestrian modules shall be the test procedures specified in § 431.223(b).

(b) *Testing and Calculations.* Determine the nominal wattage and maximum wattage of each covered traffic signal module or pedestrian module by conducting the test procedure set forth in Environmental Protection Agency,

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“ENERGY STAR Program Requirements for Traffic Signals,” Version 1.1, section 1, “Definitions,” and section 4, “Test Criteria.” (Incorporated by reference, see § 431.223) Use a wattmeter having an accuracy of $\pm 1\%$ to measure the nominal wattage and maximum wattage of a red and green traffic signal module, and a pedestrian module when conducting the photometric and colorimetric tests as specified by the testing procedures in VTCSH 2005.

[71 FR 71373, Dec. 8, 2006]

ENERGY CONSERVATION STANDARDS

§ 431.226 Energy conservation standards and their effective dates.

Any traffic signal module or pedestrian module manufactured on or after January 1, 2006, shall meet both of the following requirements:

(a) Have a nominal wattage and maximum wattage no greater than:

	Maximum wattage (at 74 °C)	Nominal wattage (at 25 °C)
Traffic Signal Module Type:		
12" Red Ball	17	11
8" Red Ball	13	8
12" Red Arrow	12	9
12" Green Ball	15	15
8" Green Ball	12	12
12" Green Arrow	11	11
Pedestrian Module Type:		
Combination Walking		
Man/Hand	16	13
Walking Man	12	9
Orange Hand	16	13

(b) Be installed with compatible, electrically connected signal control interface devices and conflict monitoring systems.

[70 FR 60417, Oct. 18, 2005, as amended at 71 FR 71374, Dec. 8, 2006]

Subpart N—Unit Heaters

SOURCE: 70 FR 60418, Oct. 18, 2005, unless otherwise noted.

§ 431.241 Purpose and scope.

This subpart contains energy conservation requirements for unit heaters, pursuant to Part B of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6291–6309.

§ 431.242 Definitions concerning unit heaters.

Automatic flue damper means a device installed in the flue outlet or in the inlet of or upstream of the draft control device of an individual, automatically operated, fossil fuel-fired appliance that is designed to automatically open the flue outlet during appliance operation and to automatically close the flue outlet when the appliance is in a standby condition.

Automatic vent damper means a device intended for installation in the venting system of an individual, automatically operated, fossil fuel-fired appliance either in the outlet or downstream of the appliance draft control device, which is designed to automatically open the venting system when the appliance is in operation and to automatically close off the venting system when the appliance is in a standby or shutdown condition.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Intermittent ignition device means an ignition device in which the ignition source is automatically shut off when the appliance is in an off or standby condition.

Power venting means a venting system that uses a separate fan, either integral to the appliance or attached to the vent pipe, to convey products of combustion and excess or dilution air through the vent pipe.

Unit heater means a self-contained fan-type heater designed to be installed within the heated space; however, the term does not include a warm air furnace.

Warm air furnace means commercial warm air furnace as defined in § 431.72.

[70 FR 60418, Oct. 18, 2005, as amended at 71 FR 71374, Dec. 8, 2006; 76 FR 12504, Mar. 7, 2011]

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TEST PROCEDURES [RESERVED]

ENERGY CONSERVATION STANDARDS

§ 431.246 Energy conservation standards and their effective dates.

A unit heater manufactured on or after August 8, 2008, shall:

(a) Be equipped with an intermittent ignition device; and

(b) Have power venting or an automatic flue damper. An automatic vent damper is an acceptable alternative to an automatic flue damper for those unit heaters where combustion air is drawn from the conditioned space.

[70 FR 60418, Oct. 18, 2005, as amended at 71 FR 71374, Dec. 8, 2006]

Subpart O—Commercial Prerinse Spray Valves

SOURCE: 70 FR 60418, Oct. 18, 2005, unless otherwise noted.

§ 431.261 Purpose and scope.

This subpart contains energy conservation requirements for commercial prerinse spray valves, pursuant to section 135 of the Energy Policy Act of 2005, Pub. L. 109–58.

§ 431.262 Definitions concerning commercial prerinse spray valves.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Commercial prerinse spray valve means a handheld device designed and marketed for use with commercial dishwashing and ware washing equipment that sprays water on dishes, flatware, and other food service items for the purpose of removing food residue before cleaning the items.

[70 FR 60418, Oct. 18, 2005, as amended at 71 FR 71374, Dec. 8, 2006; 76 FR 12504, Mar. 7, 2011]

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TEST PROCEDURES

§ 431.263 Materials incorporated by reference.

(a) *General.* The Department incorporates by reference the following test procedure into subpart O of part 431. The Director of the Federal Register has approved the material listed in paragraph (b) of this section for incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to this material by the standard-setting organization will not affect the DOE test procedures unless DOE amends its test procedures. The Department incorporates the material as it exists on the date of the approval by the Federal Register and a notice of any change in the material will be published in the FEDERAL REGISTER.

(b) *Test procedure incorporated by reference.* American Society for Testing and Materials (ASTM) Standard F2324–03, “Standard Test Method for Prerinse Spray Valves,” October, 2003.

(c) *Availability of reference—(1) Inspection of the test procedure.* The test procedure incorporated by reference is available for inspection at:

(i) National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741–6030, or go to: <http://www.archives.gov/federal-register/cfr/ibr-locations.html>.

(ii) U.S. Department of Energy, Forrestal Building, Room 1J–018 (Resource Room of the Building Technologies Program), 1000 Independence Avenue, SW., Washington, DC 20585–0121, (202) 586–9127, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

(2) *Obtaining a copy of the standard.* The standard incorporated by reference may be obtained from the following source: Copies of ASTM Standard F2324–03 can be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428–2959, or telephone (610) 832–9585.

[71 FR 71374, Dec. 8, 2006]

§ 431.264 Uniform test method for the measurement of flow rate for commercial prerinse spray valves.

(a) *Scope.* This section provides the test procedure for measuring, pursuant to EPCA, the water consumption flow rate of commercial prerinse spray valves.

(b) *Testing and Calculations.* The test procedure to determine the water consumption flow rate for prerinse spray valves, expressed in gallons per minute (gpm) or liters per minute (L/min), shall be conducted in accordance with the test requirements specified in sections 4.1 and 4.2 (Summary of Test Method), 5.1 (Significance and Use), 6.1 through 6.9 (Apparatus) except 6.5, 9.1 through 9.5 (Preparation of Apparatus), and 10.1 through 10.2.5. (Procedure), and calculations in accordance with sections 11.1 through 11.3.2 (Calculation and Report) of the ASTM F2324-03, "Standard Test Method for Prerinse Spray Valves." (Incorporated by reference, see § 431.263) Perform only the procedures pertinent to the measurement of flow rate. Record measurements at the resolution of the test instrumentation. Round off calculations to the same number of significant digits as the previous step. Round the final water consumption value to one decimal place as follows:

(1) A fractional number at or above the midpoint between two consecutive decimal places shall be rounded up to the higher of the two decimal places; or

(2) A fractional number below the midpoint between two consecutive decimal places shall be rounded down to the lower of the two decimal places.

[71 FR 71374, Dec. 8, 2006]

ENERGY CONSERVATION STANDARDS

§ 431.266 Energy conservation standards and their effective dates.

Commercial prerinse spray valves manufactured on or after January 1, 2006, shall have a flow rate of not more than 1.6 gallons per minute.

Subpart P—Mercury Vapor Lamp Ballasts

SOURCE: 70 FR 60418, Oct. 18, 2005, unless otherwise noted.

§ 431.281 Purpose and scope.

This subpart contains energy conservation requirements for mercury vapor lamp ballasts, pursuant to section 135 of the Energy Policy Act of 2005, Pub. L. 109-58.

§ 431.282 Definitions concerning mercury vapor lamp ballasts.

Ballast means a device used with an electric discharge lamp to obtain necessary circuit conditions (voltage, current, and waveform) for starting and operating.

High intensity discharge lamp means an electric-discharge lamp in which—

(1) The light-producing arc is stabilized by the arc tube wall temperature; and

(2) The arc tube wall loading is in excess of 3 Watts/cm², including such lamps that are mercury vapor, metal halide, and high-pressure sodium lamps.

Mercury vapor lamp means a high intensity discharge lamp, including clear, phosphor-coated, and self-ballasted screw base lamps, in which the major portion of the light is produced by radiation from mercury typically operating at a partial vapor pressure in excess of 100,000 Pa (approximately 1 atm).

Mercury vapor lamp ballast means a device that is designed and marketed to start and operate mercury vapor lamps intended for general illumination by providing the necessary voltage and current.

Specialty application mercury vapor lamp ballast means a mercury vapor lamp ballast that—

(1) Is designed and marketed for operation of mercury vapor lamps used in quality inspection, industrial processing, or scientific use, including fluorescent microscopy and ultraviolet curing; and

(2) In the case of a specialty application mercury vapor lamp ballast, the label of which—

(i) Provides that the specialty application mercury vapor lamp ballast is 'For specialty applications only, not for general illumination'; and

(ii) Specifies the specific applications for which the ballast is designed.

[74 FR 12074, Mar. 23, 2009]

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TEST PROCEDURES [RESERVED]

ENERGY CONSERVATION STANDARDS

§ 431.286 Energy conservation standards and their effective dates.

Mercury vapor lamp ballasts, other than specialty application mercury vapor lamp ballasts, shall not be manufactured or imported after January 1, 2008.

[74 FR 12074, Mar. 23, 2009]

Subpart Q—Refrigerated Bottled or Canned Beverage Vending Machines

SOURCE: 71 FR 71375, Dec. 8, 2006, unless otherwise noted.

§ 431.291 Scope.

This subpart specifies test procedures for certain commercial refrigerated bottled or canned beverage vending machines, pursuant to part C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311–6316.

§ 431.292 Definitions concerning refrigerated bottled or canned beverage vending machines.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

Bottled or canned beverage means a beverage in a sealed container.

Class A means a refrigerated bottled or canned beverage vending machine that is fully cooled, and is not a combination vending machine.

Class B means any refrigerated bottled or canned beverage vending machine not considered to be Class A, and is not a combination vending machine.

Combination vending machine means a refrigerated bottled or canned beverage vending machine that also has non-refrigerated volumes for the purpose of vending other, non-“sealed beverage” merchandise.

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Refrigerated bottled or canned beverage vending machine means a commercial refrigerator that cools bottled or canned beverages and dispenses the bottled or canned beverages on payment.

V means the refrigerated volume (ft³) of the refrigerated bottled or canned beverage vending machine, as measured by ANSI/AHAM HRF-1-2004 (incorporated by reference, see § 431.293).

[71 FR 71375, Dec. 8, 2006, as amended at 74 FR 44967, Aug. 31, 2009; 76 FR 12504, Mar. 7, 2011]

TEST PROCEDURES

§ 431.293 Materials incorporated by reference.

(a) *General.* DOE incorporates by reference the following standards into subpart Q of part 431. The material listed has been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to a standard by the standard-setting organization will not affect the DOE regulations unless and until amended by DOE. Material is incorporated as it exists on the date of the approval and a notice of any change in the material will be published in the FEDERAL REGISTER. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030 or visit

http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. This material is also available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, 202-586-2945, or visit http://www1.eere.energy.gov/buildings/appliance_standards. Standards can be obtained from the sources listed below.

(b) *ANSI.* American National Standards Institute, 25 W. 43rd Street, 4th Floor, New York, NY 10036, 212-642-4900, or visit <http://www.ansi.org>.

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(1) ANSI/AHAM HRF-1-2004, Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers, approved July 7, 2004, IBR approved for §§ 431.292 and 431.294.

(2) ANSI/ASHRAE Standard 32.1-2004, Methods of Testing for Rating Vending Machines for Bottled, Canned, and Other Sealed Beverages, approved December 2, 2004, IBR approved for § 431.294.

[74 FR 44967, Aug. 31, 2009]

§ 431.294 Uniform test method for the measurement of energy consumption of refrigerated bottled or canned beverage vending machines.

(a) *Scope.* This section provides test procedures for measuring, pursuant to EPCA, the energy consumption of refrigerated bottled or canned beverage vending machines.

(b) *Testing and Calculations.* (1) The test procedure for energy consumption of refrigerated bottled or canned beverage vending machines shall be conducted in accordance with the test procedures specified in section 4, “Instruments,” section 5, “Vending Machine Capacity,” section 6, “Test Conditions,” and sections 7.1 through 7.2.3.2, under “Test Procedures,” of ANSI/ASHRAE Standard 32.1-2004, “Methods of Testing for Rating Vending Machines for Bottled, Canned, and Other Sealed Beverages.” (Incorporated by reference, see § 431.293) In Section 6.2, “Voltage and Frequency,” test equipment with dual nameplate voltages at the lower of the two voltages only.

(2) Determine “vendible capacity” of refrigerated bottled or canned beverage vending machines in accordance with the second paragraph of section 5, “Vending Machine Capacity,” of ANSI/ASHRAE Standard 32.1-2004, “Methods of Testing for Rating Vending Machines for Bottled, Canned, and Other Sealed Beverages,” (Incorporated by reference, see § 431.293) and measure “refrigerated volume” of refrigerated bottled or canned beverage vending machines in accordance with the methodology specified in section 5.2, “Total Refrigerated Volume,” (excluding subsections 5.2.2.2 through 5.2.2.4) of the ANSI/AHAM HRF-1-2004, “Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers

and Freezers,” (Incorporated by reference, see §§ 431.63 and 431.293).

ENERGY CONSERVATION STANDARDS

§ 431.296 Energy conservation standards and their effective dates.

Each refrigerated bottled or canned beverage vending machine manufactured on or after August 31, 2012 shall have a maximum daily energy consumption (in kilowatt hours per day), when measured at the 75 °F ±2 °F and 45 ±5% RH condition, that does not exceed the following:

Equipment class	Maximum daily energy consumption (kilowatt hours per day)
Class A	MDEC = $0.055 \times V + 2.56$.
Class B	MDEC = $0.073 \times V + 3.16$.
Combination Vending Machines	[Reserved].

[74 FR 44967, Aug. 31, 2009]

Subpart R—Walk-in Coolers and Walk-in Freezers

SOURCE: 74 FR 12074, Mar. 23, 2009, unless otherwise noted.

§ 431.301 Purpose and scope.

This subpart contains energy conservation requirements for walk-in coolers and walk-in freezers, pursuant to Part C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311-6317.

§ 431.302 Definitions concerning walk-in coolers and walk-in freezers.

Basic model means all components of a given type of walk-in cooler or walk-in freezer (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency; and

(1) With respect to panels, which do not have any differing features or characteristics that affect U-factor.

(2) [Reserved]

Display door means a door designed for product movement, display, or both, rather than the passage of persons.

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Display panel means a panel that is entirely or partially comprised of glass, a transparent material, or both and is used for display purposes.

Door means an assembly installed in an opening on an interior or exterior wall that is used to allow access or close off the opening and that is movable in a sliding, pivoting, hinged, or revolving manner of movement. For walk-in coolers and walk-in freezers, a door includes the door panel, glass, framing materials, door plug, mullion, and any other elements that form the door or part of its connection to the wall.

Envelope means—

(1) The portion of a walk-in cooler or walk-in freezer that isolates the interior, refrigerated environment from the ambient, external environment; and

(2) All energy-consuming components of the walk-in cooler or walk-in freezer that are not part of its refrigeration system.

K-factor means the thermal conductivity of a material.

Manufacturer of a walk-in cooler or walk-in freezer means any person who:

(1) Manufactures a component of a walk-in cooler or walk-in freezer that affects energy consumption, including, but not limited to, refrigeration, doors, lights, windows, or walls; or

(2) Manufactures or assembles the complete walk-in cooler or walk-in freezer.

Panel means a construction component that is not a door and is used to construct the envelope of the walk-in, i.e., elements that separate the interior refrigerated environment of the walk-in from the exterior.

Refrigerated means held at a temperature at or below 55 degrees Fahrenheit using a refrigeration system.

Refrigeration system means the mechanism (including all controls and other components integral to the system's operation) used to create the refrigerated environment in the interior of a walk-in cooler or freezer, consisting of:

(1) A packaged dedicated system where the unit cooler and condensing unit are integrated into a single piece of equipment; or

(2) A split dedicated system with separate unit cooler and condensing unit sections; or

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(3) A unit cooler that is connected to a multiplex condensing system.

U-factor means the heat transmission in a unit time through a unit area of a specimen or product and its boundary air films, induced by a unit temperature difference between the environments on each side.

Walk-in cooler and walk-in freezer mean an enclosed storage space refrigerated to temperatures, respectively, above, and at or below 32 degrees Fahrenheit that can be walked into, and has a total chilled storage area of less than 3,000 square feet; however the terms do not include products designed and marketed exclusively for medical, scientific, or research purposes.

[74 FR 12074, Mar. 23, 2009, as amended at 76 FR 12504, Mar. 7, 2011; 76 FR 21604, Apr. 15, 2011; 76 FR 33631, June 9, 2011]

TEST PROCEDURES

§ 431.303 Materials incorporated by reference.

(a) *General.* We incorporate by reference the following standards into subpart R of part 431. The material listed has been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to a standard by the standard-setting organization will not affect the DOE regulations unless and until amended by DOE. Material is incorporated as it exists on the date of the approval and a notice of any change in the material will be published in the FEDERAL REGISTER. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030 or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. Also, this material is available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, 202-586-2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays, or go to: <http://www1.eere.energy.gov/buildings/>

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appliance standards/. Standards can be obtained from the sources listed below.

(b) *AHRI*. Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, (703) 600-0366, or <http://www.ahrinet.org>.

(1) AHRI 1250 (I-P)-2009, ("AHRI 1250"), 2009 Standard for Performance Rating of Walk-In Coolers and Freezers, approved 2009, IBR approved for § 431.304.

(2) [Reserved]

(c) *ASTM*. American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, (610) 832-9500, or <http://www.astm.org>.

(1) ASTM C518-04 ("ASTM C518"), Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus, approved May 1, 2004, IBR approved for § 431.304 and appendix A to subpart R of part 431.

(2) ASTM C1363-05, ("ASTM C1363"), Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus, approved May 1, 2005, IBR approved for appendix A to subpart R of part 431.

(d) *CEN*. European Committee for Standardization (French: Norme or German: Norm), Avenue Marnix 17, B-1000 Brussels, Belgium, Tel: + 32 2 550 08 11, Fax: + 32 2 550 08 19 or <http://www.cen.eu/>.

(1) DIN EN 13164:2009-02, ("DIN EN 13164"), Thermal insulation products for buildings—Factory made products of extruded polystyrene foam (XPS)—Specification, approved February 2009, IBR approved for appendix A to subpart R of part 431.

(2) DIN EN 13165:2009-02, ("DIN EN 13165"), Thermal insulation products for buildings—Factory made rigid polyurethane foam (PUR) products—Specification, approved February 2009, IBR approved for appendix A to subpart R of part 431.

(e) *NFRC*. National Fenestration Rating Council, 6305 Ivy Lane, Ste. 140, Greenbelt, MD 20770, (301) 589-1776, or <http://www.nfrc.org/>.

(1) NFRC 100-2010[E0A1], ("NFRC 100"), Procedure for Determining Fenestration Product U-factors, approved

June 2010, IBR approved for appendix A to subpart R of part 431.

(2) [Reserved]

[74 FR 12074, Mar. 23, 2009, as amended at 76 FR 21605, Apr. 15, 2011; 76 FR 33631, June 9, 2011]

§ 431.304 Uniform test method for the measurement of energy consumption of walk-in coolers and walk-in freezers.

(a) *Scope*. This section provides test procedures for measuring, pursuant to EPCA, the energy consumption of refrigerated bottled or canned beverage vending machines.

(b) *Testing and Calculations—EISA 2007 Test Procedure*. Manufacturers shall use this paragraph (b) for the purposes of certifying compliance with the applicable energy conservation standards of the R-value of panels until January 1, 2015.

(1) The R value shall be the 1/K factor multiplied by the thickness of the panel.

(2) The K factor shall be based on ASTM C518 (incorporated by reference, see § 431.303).

(3) For calculating the R value for freezers, the K factor of the foam at 20 degrees Fahrenheit (average foam temperature) shall be used.

(4) For calculating the R value for coolers, the K factor of the foam at 55 degrees Fahrenheit (average foam temperature) shall be used.

(5) Foam shall be tested after it is produced in its final chemical form. Foam produced inside of a panel ("foam-in-place") must be tested in its final foamed state and must not include any structural members or non-foam materials other than the panel's protective skins or facers. A test sample less than or equal to 4 inches thick must be taken from the center of the foam-in-place panels. Foam produced as board stock may be tested prior to its incorporation into a final panel.

(6) Manufacturers are not required to consider non-foam member and/or edge regions in ASTM C518 testing.

(c) *Testing and Calculations—Amended Test Procedures*. Manufacturers shall use this paragraph (c) for any representations of energy efficiency/energy use

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starting on October 12, 2011 and to certify compliance to the energy conservation standards of the R-value of panels on or after January 1, 2015.

(1) The R value shall be the 1/K factor multiplied by the thickness of the panel.

(2) The K factor shall be based on ASTM C518 (incorporated by reference; see § 431.303).

(3) For calculating the R value for freezers, the K factor of the foam at 20 degrees Fahrenheit (average foam temperature) shall be used.

(4) For calculating the R value for coolers, the K factor of the foam at 55 degrees Fahrenheit (average foam temperature) shall be used.

(5) For ASTM C518 testing, foam shall be tested after it is produced in its final chemical form. Foam produced inside of a panel (“foam-in-place”) must be tested in its final foamed state and must not include any structural members or non-foam materials other than the panel’s protective skins or facers. A test sample less than or equal to 4 inches thick must be taken from the center of the foam-in-place panels. Foam produced as board stock may be tested prior to its incorporation into a final panel.

(6) Manufacturers are not required to consider non-foam member and/or edge regions in ASTM C518 testing.

(7) Determine the U-factor, conduction load, and energy use of walk-in cooler and walk-in freezer display panels, floor panels, and non-floor panels by conducting the test procedure set forth in appendix A to this subpart, sections 4.1, 4.2, and 4.3, respectively.

(8) Determine the energy use of walk-in cooler and walk-in freezer display doors and non-display doors by conducting the test procedure set forth in appendix A to this subpart, sections 4.4 and 4.5, respectively.

(9) Determine the Annual Walk-in Energy Factor of walk-in cooler and walk-in freezer refrigeration systems by conducting the test procedure set forth in AHRI 1250 (incorporated by reference; see § 431.303).

(10) Determine the annual energy consumption of walk-in cooler and walk-in freezer refrigeration systems:

(i) For systems consisting of a packaged dedicated system or a split dedicated system, where the condensing unit is located outdoors, by conducting the test procedure set forth in AHRI 1250 and recording the annual energy consumption term in the equation for annual walk-in energy factor in section 7 of AHRI 1250:

$$\text{Annual Energy Consumption} = \sum_{j=1}^n E(t_j)$$

where t_j and n represent the outdoor temperature at each bin j and the number of hours in each bin j , respectively, for the temperature bins listed in Table D1 of AHRI 1250.

(ii) For systems consisting of a packaged dedicated system or a split dedicated system where the condensing unit is located in a conditioned space, by performing the following calculation:

$$\text{Annual Energy Consumption} = \left(\frac{0.33 \times BLH + 0.67 \times BLL}{\text{Annual Walk-in Energy Factor}} \right) \times 8760$$

where BLH and BLL for refrigerator and freezer systems are defined in sections 6.2.1 and 6.2.2, respectively, of AHRI 1250

and the annual walk-in energy factor is calculated from the results of the test procedures set forth in AHRI 1250.

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(iii) For systems consisting of a single unit cooler or a set of multiple unit coolers serving a single piece of equip-

ment and connected to a multiplex condensing system, by performing the following calculation:

$$\text{Annual Energy Consumption} = \left(\frac{0.33 \times BLH + 0.67 \times BLL}{\text{Annual Walk-in Energy Factor}} \right) \times 8760$$

where BLH and BLL for refrigerator and freezer systems are defined in section 7.9.2.2 and 7.9.2.3, respectively, of AHRI 1250 and the annual walk-in energy factor is calculated from the results of the test procedures set forth in AHRI 1250.

[74 FR 12074, Mar. 23, 2009, as amended at 76 FR 21605, Apr. 15, 2011; 76 FR 33631, June 9, 2011; 76 FR 65365, Oct. 21, 2011]

§431.305 [Reserved]

ENERGY CONSERVATION STANDARDS

§431.306 Energy conservation standards and their effective dates.

(a) Each walk-in cooler or walk-in freezer manufactured on or after January 1, 2009, shall—

(1) Have automatic door closers that firmly close all walk-in doors that have been closed to within 1 inch of full closure, except that this paragraph shall not apply to doors wider than 3 feet 9 inches or taller than 7 feet;

(2) Have strip doors, spring hinged doors, or other method of minimizing infiltration when doors are open;

(3) Contain wall, ceiling, and door insulation of at least R-25 for coolers and R-32 for freezers, except that this paragraph shall not apply to glazed portions of doors nor to structural members;

(4) Contain floor insulation of at least R-28 for freezers;

(5) For evaporator fan motors of under 1 horsepower and less than 460 volts, use—

(i) Electronically commutated motors (brushless direct current motors); or

(ii) 3-phase motors;

(6) For condenser fan motors of under 1 horsepower, use—

(i) Electronically commutated motors (brushless direct current motors);

(ii) Permanent split capacitor-type motors; or

(iii) 3-phase motors; and

(7) For all interior lights, use light sources with an efficacy of 40 lumens per watt or more, including ballast losses (if any), except that light sources with an efficacy of 40 lumens per watt or less, including ballast losses (if any), may be used in conjunction with a timer or device that turns off the lights within 15 minutes of when the walk-in cooler or walk-in freezer is not occupied by people.

(b) Each walk-in cooler or walk-in freezer with transparent reach-in doors manufactured on or after January 1, 2009, shall also meet the following specifications:

(1) Transparent reach-in doors for walk-in freezers and windows in walk-in freezer doors shall be of triple-pane glass with either heat-reflective treated glass or gas fill.

(2) Transparent reach-in doors for walk-in coolers and windows in walk-in cooler doors shall be—

(i) Double-pane glass with heat-reflective treated glass and gas fill; or

(ii) Triple-pane glass with either heat-reflective treated glass or gas fill.

(3) If the walk-in cooler or walk-in freezer has an antisweat heater without antisweat heat controls, the walk-in cooler and walk-in freezer shall have a total door rail, glass, and frame heater power draw of not more than 7.1 watts per square foot of door opening (for freezers) and 3.0 watts per square foot of door opening (for coolers).

(4) If the walk-in cooler or walk-in freezer has an antisweat heater with antisweat heat controls, and the total door rail, glass, and frame heater power draw is more than 7.1 watts per square foot of door opening (for freezers) and 3.0 watts per square foot of door opening (for coolers), the antisweat heat controls shall reduce the energy use of the antisweat heater

in a quantity corresponding to the relative humidity in the air outside the door or to the condensation on the inner glass pane.

APPENDIX A TO SUBPART R OF PART 431—UNIFORM TEST METHOD FOR THE MEASUREMENT OF ENERGY CONSUMPTION OF THE COMPONENTS OF ENVELOPES OF WALK-IN COOLERS AND WALK-IN FREEZERS

1.0 Scope

This appendix covers the test requirements used to measure the energy consumption of the components that make up the envelope of a walk-in cooler or walk-in freezer.

2.0 Definitions

The definitions contained in §431.302 are applicable to this appendix.

3.0 Additional Definitions

3.1 Automatic door opener/closer means a device or control system that “automatically” opens and closes doors without direct user contact, such as a motion sensor that senses when a forklift is approaching the entrance to a door and opens it, and then closes the door after the forklift has passed.

3.2 Core region means the part of the panel that is not the edge region.

3.3 Edge region means a region of the panel that is wide enough to encompass any framing members and edge effects. If the panel contains framing members (e.g. a wood frame) then the width of the edge region must be as wide as any framing member plus 2 in. ± 0.25 in. If the panel does not contain framing members then the width of the edge region must be 4 in ± 0.25 in. For walk-in panels that utilize vacuum insulated panels (VIP) for insulation, the width of the edge region must be the lesser of 4.5 in. ± 1 in. or the maximum width that does not cause the VIP to be pierced by the cutting device when the edge region is cut.

3.4 Surface area means the area of the surface of the walk-in component that would be external to the walk-in. For example, for panel, the surface area would be the area of the side of the panel that faces the outside of the walk-in. It would not include edges of the panel that are not exposed to the outside of the walk-in.

3.5 Rating conditions means, unless explicitly stated otherwise, all conditions shown in Table A.1. For installations where two or more walk-in envelope components share any surface(s), the “external conditions” of the shared surface(s) must reflect the internal conditions of the adjacent walk-in. For example, if a walk-in component divides a walk-in freezer from a walk-in cooler, then the internal conditions are the freezer rating conditions and the external conditions are the cooler rating conditions.

3.6 Percent time off (PTO) means the percent of time that an electrical device is assumed to be off.

TABLE A.1—TEMPERATURE CONDITIONS

Internal Temperatures (cooled space within the envelope)	
Cooler Dry Bulb Temperature	35 °F.
Freezer Dry Bulb Temperature	– 10 °F.
External Temperatures (space external to the envelope)	
Freezer and Cooler Dry Bulb Temperatures	75 °F.
Subfloor Temperatures	
Freezer and Cooler Dry Bulb Temperatures	55 °F.

4.0 Calculation Instructions

4.1 Display Panels

(a) Calculate the U-factor of the display panel in accordance with section 5.3 of this appendix, Btu/h-ft²-°F.

(b) Calculate the display panel surface area, as defined in section 3.4 of this appendix, A_{dp}, ft², with standard geometric formulas or engineering software.

(c) Calculate the temperature differential, ΔT_{dp} , °F, for the display panel, as follows:

$$\Delta T_{dp} = |T_{DB,ext,dp} - T_{DB,int,dp}| \quad (4-1)$$

Where:

$T_{DB,ext,dp}$ = dry-bulb air external temperature, °F, as prescribed in Table A.1; and

$T_{DB,int,dp}$ = dry-bulb air temperature internal to the cooler or freezer, °F, as prescribed in Table A.1.

(d) Calculate the conduction load through the display panel, Q_{cond-dp}, Btu/h, as follows:

$$Q_{\text{cond,dp}} = A_{\text{dp}} \times \Delta T_{\text{dp}} \times U_{\text{dp}} \quad (4-2)$$

Where:

A_{dp} = surface area of the walk-in display panel, ft²;

ΔT_{dp} = temperature differential between refrigerated and adjacent zones, °F; and

U_{dp} = thermal transmittance, U-factor, of the display panel in accordance with section 5.3 of this appendix, Btu/h-ft²-°F.

(e) Select Energy Efficiency Ratio (EER), as follows:

(1) For coolers, use EER = 12.4 Btu/W-h

(2) For freezers, use EER = 6.3 Btu/W-h

(f) Calculate the total daily energy consumption, E_{dp} , kWh/day, as follows:

$$E_{\text{dp}} = \frac{Q_{\text{cond,dp}}}{\text{EER}} \times \frac{24 \text{ h} \times 1 \text{ kW}}{1 \text{ day} \times 1000 \text{ W}} \quad (4-3)$$

Where:

$Q_{\text{cond, dp}}$ = the conduction load through the display panel, Btu/h; and EER = EER of walk-in (cooler or freezer), Btu/W-h.

4.2 Floor Panels

(a) Calculate the surface area, as defined in section 3.4 of this appendix, of the floor panel edge, as defined in section 3.3, $A_{\text{fp edge}}$, ft², with standard geometric formulas or engineering software as directed in section 5.1 of this appendix.

(b) Calculate the surface area, as defined in section 3.4 of this appendix, of the floor panel core, as defined in section 3.2, $A_{\text{fp core}}$, ft², with standard geometric formulas or engineering software as directed in section 5.1 of this appendix.

(c) Calculate the total area of the floor panel, A_{fp} , ft², as follows:

$$A_{\text{fp}} = A_{\text{fp core}} + A_{\text{fp edge}} \quad (4-4)$$

Where:

$A_{\text{fp core}}$ = floor panel core area, ft²; and

$A_{\text{fp edge}}$ = floor panel edge area, ft².

(d) Calculate the temperature differential of the floor panel, ΔT_{fp} , °F, as follows:

$$\Delta T_{\text{fp}} = |T_{\text{ext,fp}} - T_{\text{DB,int,fp}}| \quad (4-5)$$

Where:

$T_{\text{ext, fp}}$ = subfloor temperature, °F, as prescribed in Table A.1; and

$T_{\text{DB,int, fp}}$ = dry-bulb air internal temperature, °F, as prescribed in Table A.1. If the

panel spans both cooler and freezer temperatures, the freezer temperature must be used.

(e) Calculate the floor foam degradation factor, DF_{fp} , unitless, as follows:

$$DF_{\text{fp}} = \frac{R_{\text{LTTRfp}}}{R_{\text{O,fp}}} \quad (4-6)$$

Where:

$R_{\text{LTTR,fp}}$ = the long term thermal resistance R-value of the floor panel foam in accordance with section 5.2 of this appendix, h-ft²-°F/Btu; and

$R_{\text{O,fp}}$ = the R-value of foam determined in accordance with ASTM C518 (incorporated

by reference; see section §431.303) for purposes of compliance with the appropriate energy conservation standard, h-ft²- °F/Btu.

(f) Calculate the U-factor for panel core region modified by the long term thermal transmittance of foam, $U_{LT,fp \text{ core}}$, Btu/h-ft²- °F, as follows:

$$U_{LT,fp \text{ core}} = \frac{U_{fp \text{ core}}}{DF_{fp}} \quad (4-7)$$

Where:

$U_{fp \text{ core}}$ = the U-factor in accordance with section 5.1 of this appendix, Btu/h-ft²- °F; and

DF_{fp} = floor foam degradation factor, unitless.

(g) Calculate the overall U-factor of the floor panel, U_{fp} , Btu/h-ft²- °F, as follows:

$$U_{fp} = \frac{A_{fp \text{ edge}} \times U_{fp \text{ edge}} + A_{fp \text{ core}} \times U_{LT,fp \text{ core}}}{A_{fp}} \quad (4-8)$$

Where:

$A_{fp \text{ edge}}$ = area of floor panel edge, ft²;

$U_{fp \text{ edge}}$ = U-factor for panel edge area in accordance with section 5.1 of this appendix, Btu/h-ft²- °F;

$A_{fp \text{ core}}$ = area of floor panel core, ft²;

$U_{LT,fp \text{ core}}$ = U-factor for panel core region modified by the long term thermal transmittance of foam, Btu/h-ft²- °F; and

A_{fp} = total area of the floor panel, ft².

(h) Calculate the conduction load through floor panels, $Q_{cond-fp}$, Btu/h,

$$Q_{cond-fp} = \Delta T_{fp} \times A_{fp} \times U_{fp} \quad (4-9)$$

Where:

ΔT_{fp} = temperature differential across the floor panels, °F;

A_{fp} = total area of the floor panel, ft²; and

U_{fp} = overall U-factor of the floor panel, Btu/h-ft²- °F.

(i) Select Energy Efficiency Ratio (EER), as follows:

(1) For coolers, use EER = 12.4 Btu/W-h

(2) For freezers, use EER = 6.3 Btu/W-h

(j) Calculate the total daily energy consumption, E_{fp} , kWh/day, as follows:

$$E_{fp} = \frac{Q_{cond-fp}}{EER} \times \frac{24 \text{ h} \times 1 \text{ kW}}{1 \text{ day} \times 1000 \text{ W}} \quad (4-10)$$

Where:

$Q_{cond-fp}$ = the conduction load through the floor panel, Btu/h; and EER = EER of walk-in (cooler or freezer), Btu/W-h.

4.3 Non-Floor Panels

(a) Calculate the surface area, as defined in section 3.4, of the non-floor panel edge, as defined in section 3.3, $A_{nf \text{ edge}}$, ft², with standard

geometric formulas or engineering software as directed in section 5.1 of this appendix.

(b) Calculate the surface area, as defined in section 3.4, of the non-floor panel core, as defined in section 3.2, $A_{nf \text{ core}}$, ft², with standard geometric formulas or engineering software as directed in section 5.1 of this appendix.

(c) Calculate total non-floor panel area, A_{nf} , ft²:

$$A_{nf} = A_{nf \text{ edge}} + A_{nf \text{ core}} \quad (4-11)$$

Where:

$A_{nf \text{ edge}}$ = non-floor panel edge area, ft²; and
 $A_{nf \text{ core}}$ = non-floor panel core area, ft².

(d) Calculate temperature differential, ΔT_{nf} , °F:

$$\Delta T_{nf} = |T_{DB,ext,nf} - T_{DB,int,nf}| \quad (4-12)$$

Where:

$T_{DB,ext,nf}$ = dry-bulb air external temperature, °F, as prescribed in Table A.1; and
 $T_{DB,int,nf}$ = dry-bulb air internal temperature, °F, as prescribed in Table A.1. If the non-

floor panel spans both cooler and freezer temperatures, then the freezer temperature must be used.

(e) Calculate the non-floor foam degradation factor, DF_{nf} , unitless, as follows:

$$DF_{nf} = \frac{R_{LTTR,nf}}{R_{o,nf}} \quad (4-13)$$

Where:

$R_{LTTR,nf}$ = the R-value of the non-floor panel foam in accordance with section 5.2 of this appendix, h- ft²- °F/Btu; and
 $R_{o,nf}$ = the R-value of foam determined in accordance with ASTM C518 (incorporated

by reference; see section §431.303) for purposes of compliance with the appropriate energy conservation standard, h-ft²- °F/Btu.

(f) Calculate the U-factor, $U_{LT,nf \text{ core}}$, Btu/h-ft²- °F, as follows:

$$U_{LT,nf \text{ core}} = \frac{U_{nf \text{ core}}}{DF_{nf}} \quad (4-14)$$

Where:

$U_{nf \text{ core}}$ = the U-factor, in accordance with section 5.1 of this appendix, of non-floor panel, Btu/h- ft²- °F; and

DF_{nf} = the non-floor foam degradation factor, unitless.

(g) Calculate the overall U-factor of the non-floor panel, U_{nf} , Btu/h-ft²- °F, as follows:

$$U_{nf} = \frac{A_{nf \text{ edge}} \times U_{nf \text{ edge}} + A_{nf \text{ core}} \times U_{LT,nf \text{ core}}}{A_{nf}} \quad (4-15)$$

Where:

$A_{nf \text{ edge}}$ = area of non-floor panel edge, ft²;
 $U_{nf \text{ edge}}$ = U-factor for non-floor panel edge area in accordance with section 5.1 of this appendix, Btu/h-ft²- °F;
 $A_{nf \text{ core}}$ = area of non-floor panel core, ft²;

$U_{LT,nf \text{ core}}$ = U-factor for non-floor panel core region modified by the long term thermal transmittance of foam, Btu/h-ft²- °F; and

A_{nf} = total area of the non- floor panel, ft².

(h) Calculate the conduction load through non-floor panels, $Q_{cond-nf}$, Btu/h,

$$Q_{\text{cond-nf}} = \Delta T_{\text{nf}} \times A_{\text{nf}} \times U_{\text{nf}} \quad (4-16)$$

Where:

ΔT_{nf} = temperature differential across the non-floor panels, °F;
 A_{nf} = total area of the non-floor panel, ft²; and
 U_{nf} = overall U-factor of the non-floor panel, Btu/h-ft²-°F.

(i) Select Energy Efficiency Ratio (EER), as follows:

(1) For coolers, use EER = 12.4 Btu/W-h

(2) For freezers, use EER = 6.3 Btu/W-h

(j) Calculate the total daily energy consumption, E_{nf} , kWh/day, as follows:

$$E_{\text{nf}} = \frac{Q_{\text{cond-nf}}}{\text{EER}} \times \frac{24 \text{ h} \times 1 \text{ kW}}{1 \text{ day} \times 1000 \text{ W}} \quad (4-17)$$

Where:

$Q_{\text{cond-nf}}$ = the conduction load through the non-floor panel, Btu/h; and
 EER = EER of walk-in (cooler or freezer), Btu/W-h.

(b) Calculate the surface area, as defined in section 3.4 of this appendix, of the display door, A_{dd} , ft², with standard geometric formulas or engineering software.

(c) Calculate the temperature differential, ΔT_{dd} , °F, for the display door as follows:

4.4 Display Doors

4.4.1 Conduction Through Display Doors

(a) Calculate the U-factor of the door in accordance with section 5.3 of this appendix, Btu/h-ft²-°F

$$\Delta T_{\text{dd}} = |T_{\text{DB,ext,dd}} - T_{\text{DB,int,dd}}| \quad (4-18)$$

Where:

$T_{\text{DB,ext,dd}}$ = dry-bulb air temperature external to the display door, °F, as prescribed in Table A.1; and

$T_{\text{DB,int,dd}}$ = dry-bulb air temperature internal to the display door, °F, as prescribed in Table A.1.

(d) Calculate the conduction load through the display doors, $Q_{\text{cond-dd}}$, Btu/h, as follows:

$$Q_{\text{cond,dd}} = A_{\text{dd}} \times \Delta T_{\text{dd}} \times U_{\text{dd}} \quad (4-19)$$

Where:

ΔT_{dd} = temperature differential between refrigerated and adjacent zones, °F;
 A_{dd} = surface area walk-in display doors, ft²; and
 U_{dd} = thermal transmittance, U-factor of the door, in accordance with section 5.3 of this appendix, Btu/h-ft²-°F.

4.4.2 Direct Energy Consumption of Electrical Component(s) of Display Doors

Electrical components associated with display doors could include, but are not limited to: heater wire (for anti-sweat or anti-freeze application); lights (including display door

lighting systems); control system units; and sensors.

(a) Select the required value for percent time off (PTO) for each type of electricity consuming device, PTO_i (%)

(1) For lights without timers, control system or other demand-based control, PTO = 25 percent. For lighting with timers, control system or other demand-based control, PTO = 50 percent.

(2) For anti-sweat heaters on coolers (if included): Without timers, control system or other demand-based control, PTO = 0 percent. With timers, control system or other demand-based control, PTO = 75 percent. For anti-sweat heaters on freezers (if included):

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Without timers, control system or other auto-shut-off systems, PTO = 0 percent. With timers, control system or other demand-based control, PTO = 50 percent.

(3) For all other electricity consuming devices: Without timers, control system, or other auto-shut-off systems, PTO = 0 per-

cent. If it can be demonstrated that the device is controlled by a preinstalled timer, control system or other auto-shut-off system, PTO = 25 percent.

(b) Calculate the power usage for each type of electricity consuming device, $P_{dd-comp,u,t}$, kWh/day, as follows:

$$P_{dd-comp,u,t} = P_{rated,u,t} \times (1 - PTO_{u,t}) \times n_{u,t} \times \frac{24h}{day} \quad (4-20)$$

Where:

u = the index for each of type of electricity-consuming device located on either (1) the interior facing side of the display door or within the inside portion of the display door, (2) the exterior facing side of the display door, or (3) any combination of (1) and (2). For purposes of this calculation, the interior index is represented by u = int and the exterior index is represented by u = ext. If the electrical component is both on the interior and exterior side of the display door then u = int. For anti-sweat heaters sited anywhere in the display door, 75 percent of the total power is be attributed to u = int

and 25 percent of the total power is attributed to u = ext;

t = index for each type of electricity consuming device with identical rated power;

$P_{rated,u,t}$ = rated power of each component, of type t, kW;

$PTO_{u,t}$ = percent time off, for device of type t, %; and

$n_{u,t}$ = number of devices at the rated power of type t, unitless.

(c) Calculate the total electrical energy consumption for interior and exterior power, $P_{dd-tot, int}$ (kWh/day) and $P_{dd-tot, ext}$ (kWh/day), respectively, as follows:

$$P_{dd-tot,int} = \sum_i^t P_{dd-comp,int,t} \quad (4-21)$$

$$P_{dd-tot,ext} = \sum_i^t P_{dd-comp,ext,t} \quad (4-22)$$

Where:

t = index for each type of electricity consuming device with identical rated power;

$P_{dd-comp,int, t}$ = the energy usage for an electricity consuming device sited on the interior facing side of or in the display door, of type t, kWh/day; and

$P_{dd-comp,ext, t}$ = the energy usage for an electricity consuming device sited on the external facing side of the display door, of type t, kWh/day.

(d) Calculate the total electrical energy consumption, P_{dd-tot} , (kWh/day), as follows:

$$P_{dd-tot} = P_{dd-tot,int} + P_{dd-tot,ext} \quad (4-23)$$

Where:

$P_{dd-tot,int}$ = the total interior electrical energy usage for the display door, kWh/day; and

$P_{dd-tot,ext}$ = the total exterior electrical energy usage for the display door, kWh/day.

4.4.3 Total Indirect Electricity Consumption Due to Electrical Devices

(a) Select Energy Efficiency Ratio (EER), as follows:

(1) For coolers, use EER = 12.4 Btu/Wh

(2) For freezers, use EER = 6.3 Btu/Wh

(b) Calculate the additional refrigeration energy consumption due to thermal output

from electrical components sited inside the display door, $C_{dd-load}$, kWh/day, as follows:

$$C_{dd-load} = P_{dd-tot,int} \times \frac{3.412 \text{ Btu}}{\text{EER W-h}} \quad (4-24)$$

Where:

EER = EER of walk-in cooler or walk-in freezer, Btu/W-h; and

$P_{dd-tot,int}$ = The total internal electrical energy consumption due for the display door, kWh/day.

4.4.4 Total Display Door Energy Consumption

(a) Select Energy Efficiency Ratio (EER), as follows:

(1) For coolers, use EER = 12.4 Btu/W-h

(2) For freezers, use EER = 6.3 Btu/W-h

(b) Calculate the total daily energy consumption due to conduction thermal load, $E_{dd, thermal}$, kWh/day, as follows:

$$E_{dd,thermal} = \frac{Q_{cond,dd}}{\text{EER}} \times \frac{24 \text{ h} \times 1 \text{ kW}}{1 \text{ day} \times 1000 \text{ W}} \quad (4-25)$$

Where:

$Q_{cond, dd}$ = the conduction load through the display door, Btu/h; and

EER = EER of walk-in (cooler or freezer), Btu/W-h.

(c) Calculate the total energy, $E_{dd,tot}$, kWh/day,

$$E_{dd,tot} = E_{dd,thermal} + P_{dd-tot} + C_{dd-load} \quad (4-26)$$

Where:

$E_{dd, thermal}$ = the total daily energy consumption due to thermal load for the display door, kWh/day;

P_{dd-tot} = the total electrical load, kWh/day; and

$C_{dd-load}$ = additional refrigeration load due to thermal output from electrical components contained within the display door, kWh/day.

4.5 Non-Display Doors

4.5.1 Conduction Through Non-Display Doors

(a) Calculate the surface area, as defined in section 3.4 of this appendix, of the non-display door, A_{nd} , ft², with standard geometric formulas or with engineering software.

(b) Calculate the temperature differential of the non-display door, ΔT_{nd} , °F, as follows:

$$\Delta T_{nd} = |T_{DB,ext,nd} - T_{DB,int,nd}| \quad (4-27)$$

Where:

$T_{DB,ext, nd}$ = dry-bulb air external temperature, °F, as prescribed by Table A.1; and

$T_{DB,int, nd}$ = dry-bulb air internal temperature, °F, as prescribed by Table A.1. If the

component spans both cooler and freezer spaces, the freezer temperature must be used.

(c) Calculate the conduction load through the non-display door: $Q_{cond-nd}$, Btu/h,

$$Q_{cond-nd} = \Delta T_{nd} \times A_{nd} \times U_{nd} \quad (4-28)$$

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Where:

ΔT_{nd} = temperature differential across the non-display door, °F;

U_{nd} = thermal transmittance, U-factor of the door, in accordance with section 5.3 of this appendix, Btu/h-ft²-°F; and

A_{nd} = area of non-display door, ft².

4.5.2 Direct Energy Consumption of Electrical Components of Non-Display Doors

Electrical components associated with a walk-in non-display door comprise any components that are on the non-display door and that directly consume electrical energy. This includes, but is not limited to, heater wire (for anti-sweat or anti-freeze application), control system units, and sensors.

(a) Select the required value for percent time off for each type of electricity consuming device, PTO_i (%).

(1) For lighting without timers, control system or other demand-based control, PTO

= 25 percent. For lighting with timers, control system or other demand-based control, PTO = 50 percent.

(2) For anti-sweat heaters on coolers (if included): Without timers, control system or other demand-based control, PTO = 0 percent. With timers, control system or other demand-based control, PTO = 75 percent. For anti-sweat heaters on freezers (if included): Without timers, control system or other auto-shut-off systems, PTO = 0 percent. With timers, control system or other demand-based control, PTO = 50 percent.

(3) For all other electricity consuming devices: Without timers, control system, or other auto-shut-off systems, PTO = 0 percent. If it can be demonstrated that the device is controlled by a preinstalled timer, control system or other auto-shut-off system, PTO = 25 percent.

(b) Calculate the power usage for each type of electricity consuming device, $P_{nd-comp,u,t}$, kWh/day, as follows:

$$P_{nd-comp,u,t} = P_{rated,u,t} \times (1 - PTO_{u,t}) \times n_{u,t} \times \frac{24h}{day} \quad (4-29)$$

Where:

u = the index for each of type of electricity-consuming device located on either (1) the interior facing side of the display door or within the inside portion of the display door, (2) the exterior facing side of the display door, or (3) any combination of (1) and (2). For purposes of this calculation, the interior index is represented by $u = int$ and the exterior index is represented by $u = ext$. If the electrical component is both on the interior and exterior side of the display door then $u = int$. For anti-sweat heaters sited anywhere in the display door, 75 percent of the total power is attributed to $u=int$

and 25 percent of the total power is attributed to $u=ext$;

t = index for each type of electricity consuming device with identical rated power;

$P_{rated,u,t}$ = rated power of each component, of type t , kW;

PTO _{u,t} = percent time off, for device of type t , %; and

$n_{u,t}$ = number of devices at the rated power of type t , unitless.

(c) Calculate the total electrical energy consumption for interior and exterior power, $P_{nd-tot, int}$ (kWh/day) and $P_{nd-tot, ext}$ (kWh/day), respectively, as follows:

$$P_{nd-tot,int} = \sum_1^t P_{nd-comp,int,t} \quad (4-30)$$

$$P_{nd-tot,ext} = \sum_1^t P_{nd-comp,ext,t} \quad (4-31)$$

Where:

t = index for each type of electricity consuming device with identical rated power;

$P_{nd-comp,int, t}$ = the energy usage for an electricity consuming device sited on the in-

ternal facing side or internal to the non-display door, of type t , kWh/day; and

$P_{nd-comp,ext, t}$ = the energy usage for an electricity consuming device sited on the external facing side of the non-display door, of type t , kWh/day. For anti-sweat heaters,

(d) Calculate the total electrical energy consumption, P_{nd-tot} , kWh/day, as follows:

$$P_{nd-tot} = P_{nd-tot,int} + P_{nd-tot,ext} \quad (4-32)$$

Where:

$P_{nd-tot,int}$ = the total interior electrical energy usage for the non-display door, of type t, kWh/day; and

$P_{nd-tot,ext}$ = the total exterior electrical energy usage for the non-display door, of type t, kWh/day.

4.5.3 Total Indirect Electricity

Consumption Due to Electrical Devices

(a) Select Energy Efficiency Ratio (EER), as follows:

(1) For coolers, use EER = 12.4 Btu/Wh

(2) For freezers, use EER = 6.3 Btu/Wh

(b) Calculate the additional refrigeration energy consumption due to thermal output from electrical components associated with the non-display door, $C_{nd-load}$, kWh/day, as follows:

$$C_{nd-load} = P_{nd-tot,int} \times \frac{3.412 \text{ Btu}}{\text{EER W-h}} \quad (4-33)$$

Where:

EER = EER of walk-in cooler or freezer, Btu/W-h; and

$P_{nd-tot,int}$ = the total interior electrical energy consumption for the non-display door, kWh/day.

4.5.4 Total Non-Display Door Energy Consumption

(a) Select Energy Efficiency Ratio (EER), as follows:

(1) For coolers, use EER = 12.4 Btu/W-h

(2) For freezers, use EER = 6.3 Btu/W-h

(b) Calculate the total daily energy consumption due to thermal load, $E_{nd, thermal}$, kWh/day, as follows:

$$E_{nd,thermal} = \frac{Q_{cond-nd}}{\text{EER}} \times \frac{24 \text{ h} \times 1 \text{ kW}}{1 \text{ day} \times 1000 \text{ W}} \quad (4-34)$$

Where:

$Q_{cond-nd}$ = the conduction load through the non-display door, Btu/hr; and

EER = EER of walk-in (cooler or freezer), Btu/W-h.

(c) Calculate the total energy, $E_{nd,tot}$, kWh/day, as follows:

$$E_{nd,tot} = E_{nd,thermal} + P_{nd-tot} + C_{load} \quad (4-35)$$

Where:

$E_{nd, thermal}$ = the total daily energy consumption due to thermal load for the non-display door, kWh/day;

P_{nd-tot} = the total electrical energy consumption, kWh/day; and

$C_{nd-load}$ = additional refrigeration load due to thermal output from electrical components contained on the inside face of the non-display door, kWh/day.

5.0 Test Methods and Measurements

5.1 Measuring Floor and Non-floor Panel U-factors

Follow the test procedure in ASTM C1363, (incorporated by reference; see §431.303), exactly, with these exceptions:

(1) Test Sample Geometry Requirements

(i) Two (2) panels, 8 ft. \pm 1 ft. long and 4 ft. \pm 1 ft. wide must be used.

(ii) The panel edges must be joined using the manufacturer's panel interface joining system (e.g., camlocks, standard gasketing, etc.).

(iii) The Panel Edge Test Region, see figure 1, must be cut using the following dimensions:

1. If the panel contains framing members (e.g. a wood frame), then the width of edge (W) must be as wide as any framing member plus 2 in. \pm 0.25 in. For example, if the face of the panel contains 1.5 in. thick framing members around the edge of the panel, then

width of edge (W) = 3.5 in. \pm 0.25 in and the Panel Edge Test Region would be 7 in. \pm 0.5 in. wide.

2. If the panel does not contain framing members, then the width of edge (W) must be 4 in \pm 0.25 in.

3. Walk-in panels that utilize vacuum insulated panels (VIP) for insulation, width of edge (W) = the lesser of 4.5 in. \pm 1 in. or the maximum width that does not cause the VIP to be pierced by the cutting device when the edge region is cut.

(iv) Panel Core Test Region of length Y and height Z, see Figure 1, must also be cut from one of the two panels such that panel length = Y + X, panel height = Z + X where X=2W.

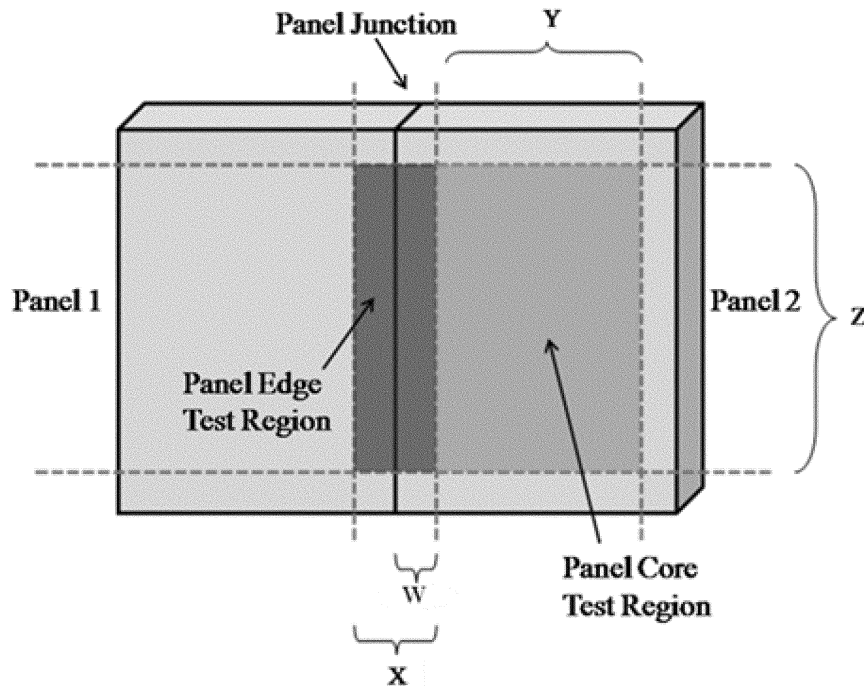


Figure 1 ASTM C1363 Test Regions (Note: diagram not drawn to scale)

(2) Testing Conditions

(i) The air temperature on the "hot side", as denoted in ASTM C1363, of the non-floor panel should be maintained at 75 °F \pm 1 °F.

1. Exception: When testing floor panels, the air temperature should be maintained at 55 °F \pm 1 °F.

(ii) The temperature on the "cold side", as denoted in ASTM C1363, of the panel should be maintained at 35 °F \pm 1 °F for the panels used for walk-in coolers and -10 °F \pm 1 °F for panels used for walk-in freezers.

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(iii) The air velocity must be maintained as natural convection conditions as described in ASTM C1363. The test must be completed using the masked method and with surround panel in place as described in ASTM C1363.

(3) Required Test Measurements

(i) Non-floor Panels

1. Panel Edge Region U-factor: $U_{nf, edge}$

2. Panel Core Region U-factor: $U_{nf, core}$

(ii) Floor Panels

1. Floor Panel Edge Region U-factor: $U_{fp, edge}$

2. Floor Panel Core Region U-factor: $U_{fp, core}$

5.2 Measuring Long Term Thermal Resistance (LTTR) of Insulating Foam

Follow the test procedure in Annex C of DIN EN 13164 or Annex C of DIN EN 13165 (as applicable), (incorporated by reference; see § 431.303), exactly, with these exceptions:

(1) Temperatures During Thermal Resistance Measurement

(i) For freezers: 20 °F ± 1 °F must be used.

(ii) For coolers: 55 °F ± 1 °F must be used.

(2) Sample Panel Preparation

(i) A 800mm × 800mm square (× thickness of the panel) section cut from the geometric center of the panel that is being tested must be used as the sample for completing DIN EN 13165.

(ii) A 500mm × 500mm square (× thickness of the panel) section cut from the geometric center of the panel that is being tested must be used as the sample for completing DIN EN 13164.

(3) Required Test Measurements

(i) Non-floor Panels

1. Long Term Thermal Resistance: $R_{LTTR, nf}$

(ii) Floor Panels

1. Long Term Thermal Resistance: $R_{LTTR, fp}$

5.3 U-factor of Doors and Display Panels

(a) Follow the procedure in NFRC 100, (incorporated by reference; see § 431.303), exactly, with these exceptions:

(1) The average convective heat transfer coefficient on both interior and exterior surfaces of the door should be based on the coefficients described in section 4.3 of NFRC 100.

(2) Internal conditions:

(i) Air temperature of 35 °F (1.7 °C) for cooler doors and -10 °F (-23.3 °C) for freezer doors

(ii) Mean inside radiant temperature must be the same as shown in section 5.3(a)(2)(i), above.

(3) External conditions

(i) Air temperature of 75 °F (23.9 °C)

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(ii) Mean outside radiant temperature must be the same as section 5.3(a)(3)(i), above.

(4) Direct solar irradiance = 0 W/m² (Btu/h-ft²).

(b) Required Test Measurements

(i) Display Doors and Display Panels

1. Thermal Transmittance: U_{dd}

(ii) Non-Display Door

1. Thermal Transmittance: U_{nd}

[76 FR 21606, Apr. 15, 2011, as amended at 76 FR 31796, June 2, 2011; 76 FR 33632, June 9, 2011]

Subpart S—Metal Halide Lamp Ballasts and Fixtures

SOURCE: 74 FR 12075, Mar. 23, 2009, unless otherwise noted.

§ 431.321 Purpose and scope.

This subpart contains energy conservation requirements for metal halide lamp ballasts and fixtures, pursuant to Part A of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6291–6309.

[75 FR 10966, Mar. 9, 2010]

§ 431.322 Definitions concerning metal halide lamp ballasts and fixtures.

AC control signal means an alternating current (AC) signal that is supplied to the ballast using additional wiring for the purpose of controlling the ballast and putting the ballast in standby mode.

Active mode means the condition in which an energy-using product:

(1) Is connected to a main power source;

(2) Has been activated; and

(3) Provides one or more main functions.

Ballast means a device used with an electric discharge lamp to obtain necessary circuit conditions (voltage, current, and waveform) for starting and operating.

Ballast efficiency means, in the case of a high intensity discharge fixture, the efficiency of a lamp and ballast combination, expressed as a percentage, and calculated in accordance with the following formula: Efficiency = P_{out}/P_{in} where:

(1) P_{out} equals the measured operating lamp wattage;

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(2) P_{in} equals the measured operating input wattage;

(3) The lamp, and the capacitor when the capacitor is provided, shall constitute a nominal system in accordance with the ANSI C78.43, (incorporated by reference; see § 431.323);

(4) For ballasts with a frequency of 60 Hz, P_{in} and P_{out} shall be measured after lamps have been stabilized according to section 4.4 of ANSI C82.6 (incorporated by reference; see § 431.323) using a wattmeter with accuracy specified in section 4.5 of ANSI C82.6; and

(5) For ballasts with a frequency greater than 60 Hz, P_{in} and P_{out} shall have a basic accuracy of ± 0.5 percent at the higher of either 3 times the output operating frequency of the ballast or 2.4 kHz.

Basic model means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency, and are rated to operate a given lamp type and wattage.

DC control signal means a direct current (DC) signal that is supplied to the ballast using additional wiring for the purpose of controlling the ballast and putting the ballast in standby mode.

Electronic ballast means a device that uses semiconductors as the primary means to control lamp starting and operation.

Metal halide ballast means a ballast used to start and operate metal halide lamps.

Metal halide lamp means a high intensity discharge lamp in which the major portion of the light is produced by radiation of metal halides and their products of dissociation, possibly in combination with metallic vapors.

Metal halide lamp fixture means a light fixture for general lighting application designed to be operated with a metal halide lamp and a ballast for a metal halide lamp.

Off mode means the condition in which an energy-using product:

(1) Is connected to a main power source; and

(2) Is not providing any standby or active mode function.

PLC control signal means a power line carrier (PLC) signal that is supplied to the ballast using the input ballast wiring for the purpose of controlling the ballast and putting the ballast in standby mode.

Probe-start metal halide ballast means a ballast that starts a probe-start metal halide lamp that contains a third starting electrode (probe) in the arc tube, and does not generally contain an igniter but instead starts lamps with high ballast open circuit voltage.

Pulse-start metal halide ballast means an electronic or electromagnetic ballast that starts a pulse-start metal halide lamp with high voltage pulses, where lamps shall be started by the ballast first providing a high voltage pulse for ionization of the gas to produce a glow discharge and then power to sustain the discharge through the glow-to-arc transition.

Standby mode means the condition in which an energy-using product:

(1) Is connected to a main power source; and

(2) Offers one or more of the following user-oriented or protective functions:

(i) To facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer;

(ii) Continuous functions, including information or status displays (including clocks) or sensor-based functions.

Wireless control signal means a wireless signal that is radiated to and received by the ballast for the purpose of controlling the ballast and putting the ballast in standby mode.

[74 FR 12075, Mar. 23, 2009, as amended at 75 FR 10966, Mar. 9, 2010; 74 FR 12074, Mar. 23, 2009]

TEST PROCEDURES

§ 431.323 Materials incorporated by reference.

(a) *General.* We incorporate by reference the following standards into subpart S of part 431. The material listed has been approved for incorporation by reference by the Director of the Federal Register in accordance with 5

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U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to a standard by the standard-setting organization will not affect the DOE regulations unless and until amended by DOE. Material is incorporated as it exists on the date of the approval and a notice of any change in the material will be published in the FEDERAL REGISTER. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030 or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. Also, this material is available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, 202-586-2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays, or go to: http://www1.eere.energy.gov/buildings/appliance_standards/. Standards can be obtained from the sources listed below.

(b) *ANSI*. American National Standards Institute, 25 W. 43rd Street, 4th Floor, New York, NY 10036, 212-642-4900, or go to <http://www.ansi.org>.

(1) *ANSI C78.43-2004*, Revision and consolidation of *ANSI C78.1372-1997*, .1374-1997, .1375-1997, .1376-1997, .1377-1997, .1378-1997, .1379-1997, .1382-1997, .1384-1997, and .1650-2003 (“*ANSI C78.43*”), American National Standard for electric lamps: Single-Ended Metal Halide Lamps, approved May 5, 2004, IBR approved for § 431.322;

(2) *ANSI C82.6-2005*, Proposed Revision of *ANSI C82.6-1985* (“*ANSI C82.6*”), American National Standard for Lamp Ballasts—Ballasts for High-Intensity Discharge Lamps—Methods of Measurement, approved February 14, 2005, IBR approved for § 431.322; and § 431.324.

(c) *NFPA*. National Fire Protection Association, 11 Tracy Drive, Avon, MA 02322, 1-800-344-3555, or go to <http://www.nfpa.org>;

(1) *NFPA 70-2002* (“*NFPA 70*”), National Electrical Code 2002 Edition, IBR approved for § 431.326;

(2) [Reserved]

(e) *UL*. Underwriters Laboratories, Inc., COMM 2000, 1414 Brook Drive,

Downers Grove, IL 60515, 1-888-853-3503, or go to <http://www.ul.com>.

(1) *UL 1029 (ANSI/UL 1029-2007)* (“*UL 1029*”), Standard for Safety High-Intensity-Discharge Lamp Ballasts, 5th edition, May 25, 1994, which consists of pages dated May 25, 1994, September 28, 1995, August 3, 1998, February 7, 2001 and December 11, 2007, IBR approved for § 431.326.

(2) [Reserved]

[74 FR 12075, Mar. 23, 2009, as amended at 75 FR 10966, Mar. 9, 2010]

§ 431.324 Uniform test method for the measurement of energy efficiency and standby mode energy consumption of metal halide lamp ballasts.

(a) *Scope*. This section provides test procedures for measuring, pursuant to EPCA, the energy efficiency of metal halide ballasts.

(b) *Testing and Calculations Active Mode*. (1)(i) *Test Conditions*. The power supply, ballast test conditions, lamp position, lamp stabilization, and test instrumentation shall all conform to the requirements specified in section 4.0, “General Conditions for Electrical Performance Tests,” of *ANSI C82.6* (incorporated by reference; see § 431.323). Ambient temperatures for the testing period shall be maintained at 25 °C ±5 °C. Airflow in the room for the testing period shall be ≤0.5 meters/second. The ballast shall be operated until equilibrium. Lamps used in the test shall conform to the general requirements in section 4.4.1 of *ANSI C82.6* and be seasoned for a minimum of 100 hour prior to use in ballast tests. Basic lamp stabilization shall conform to the general requirements in section 4.4.2 of *ANSI C82.6*, and stabilization shall be reached when the lamp’s electrical characteristics vary by no more than 3-percent in three consecutive 10- to 15-minute intervals measured after the minimum burning time of 30 minutes. After the stabilization process has begun, the lamp shall not be moved or repositioned until after the testing is complete. In order to avoid heating up the test ballast during lamp stabilization, which could cause resistance changes and result in unrepeatable data, it is necessary to warm up the lamp on a standby ballast. This standby ballast should be a commercial ballast of a

type similar to the test ballast in order to be able to switch a stabilized lamp to the test ballast without extinguishing the lamp. Fast-acting or make-before-break switches are recommended to prevent the lamps from extinguishing during switchover.

(ii) *Alternative Stabilization Method.* In cases where switching without extinguishing the lamp is impossible or for low-frequency electronic ballasts, the following alternative stabilization method shall be used. The lamp characteristics are determined using a reference ballast and recorded for future comparison. The same lamp is to be driven by the ballast under test until the ballast reaches operational stability. Operational stability is defined by three consecutive measurements, 5 minutes apart, of the lamp power where the three readings are within 2.5 percent. The electrical measurements are to be taken within 5 minutes after conclusion of the stabilization period.

(2) *Test Measurement.* The ballast input power and lamp output power during operating conditions shall be measured in accordance with the methods specified in section 6.0, "Ballast Measurements (Multiple-Supply Type Ballasts)" of the ANSI C82.6 (incorporated by reference; see § 431.323).

(3) *Efficiency Calculation.* The measured lamp output power shall be divided by the ballast input power to determine the percent efficiency of the ballast under test.

(c) *Testing and Calculations-Standby Mode.* The measurement of standby mode need not be performed to determine compliance with energy conservation standards for metal halide lamp fixtures at this time. The above statement will be removed as part of the

rulemaking to amend the energy conservation standards for metal halide lamp fixtures to account for standby mode energy consumption, and the following shall apply on the compliance date for such requirements. However, all representations related to standby mode energy consumption of these products made after September 7, 2010, must be based upon results generated under this test procedure.

(1) *Test Conditions.* The power supply, ballast test conditions, and test instrumentation shall all conform to the requirements specified in section 4.0, "General Conditions for Electrical Performance Tests," of the ANSI C82.6 (incorporated by reference; see § 431.323). Ambient temperatures for the testing period shall be maintained at 25 °C ±5 °C. Send a signal to the ballast instructing it to have zero light output using the appropriate ballast communication protocol or system for the ballast being tested.

(2) *Measurement of Main Input Power.* Measure the input power (watts) to the ballast in accordance with the methods specified in section 6.0, "Ballast Measurements (Multiple-Supply Type Ballasts)" of the ANSI C82.6 (incorporated by reference; see § 431.323).

(3) *Measurement of Control Signal Power.* The power from the control signal path is measured using all applicable methods described below:

(i) *DC Control Signal.* Measure the DC control signal voltage, using a voltmeter (V), and current, using an ammeter (A) connected to the ballast in accordance with the circuit shown in Figure 1. The DC control signal power is calculated by multiplying the DC control signal voltage by the DC control signal current.

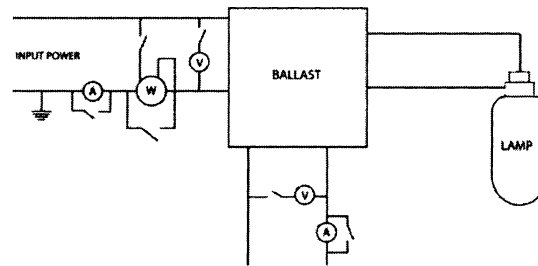


Figure 1. Circuit for Measuring DC Control Signal Power in Standby Mode

(ii) *AC Control Signal*. Measure the AC control signal power (watts), using a wattmeter capable of indicating true RMS power in watts (W), connected to the ballast in accordance with the circuit shown in Figure 2.

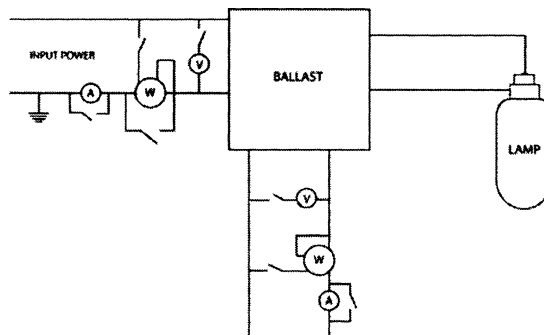


Figure 2. Circuit for Measuring AC Control Signal Power in Standby Mode

(iii) *Power Line Carrier (PLC) Control Signal*. Measure the PLC control signal power (watts), using a wattmeter capable of indicating true RMS power in watts (W) connected to the ballast in accordance with the circuit shown in Figure 3. The wattmeter must have a

frequency response that is at least 10 times higher than the PLC being measured to measure the PLC signal correctly. The wattmeter must also be high-pass filtered to filter out power at 60 Hz.

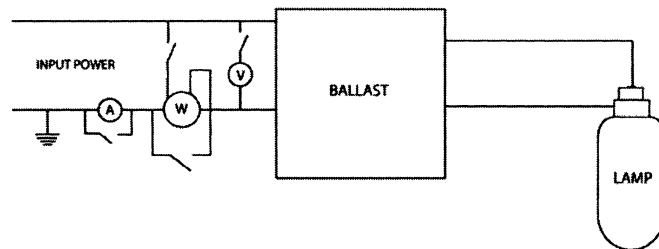


Figure 3. Circuit for Measuring PLC Control Signal Power in Standby Mode

[74 FR 12075, Mar. 23, 2009, as amended at 75 FR 10966, Mar. 9, 2010]

ENERGY CONSERVATION STANDARDS

§ 431.326 Energy conservation standards and their effective dates.

(a) Except as provided in paragraph (b) of this section, each metal halide lamp fixture manufactured on or after January 1, 2009, and designed to be operated with lamps rated greater than or equal to 150 watts but less than or equal to 500 watts shall contain—

(1) A pulse-start metal halide ballast with a minimum ballast efficiency of 88 percent;

(2) A magnetic probe-start ballast with a minimum ballast efficiency of 94 percent; or

(3) A nonpulse-start electronic ballast with either a minimum ballast efficiency of 92 percent for wattages greater than 250 watts; or a minimum ballast efficiency of 90 percent for wattages less than or equal to 250 watts.

(b) The standards described in paragraph (a) of this section do not apply to—

(1) Metal halide lamp fixtures with regulated lag ballasts;

(2) Metal halide lamp fixtures that use electronic ballasts that operate at 480 volts; or

(3) Metal halide lamp fixtures that;

(i) Are rated only for 150 watt lamps;

(ii) Are rated for use in wet locations; as specified by the National Fire Protection Association in NFPA 70 (incorporated by reference; *see* § 431.323); and

(iii) Contain a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified in UL 1029, (incorporated by reference; *see* § 431.323).

Subpart T [Reserved]

Subpart U—Enforcement for Electric Motors

SOURCE: 69 FR 61941, Oct. 21, 2004, unless otherwise noted. Redesignated at 70 FR 60416, Oct. 18, 2005.

§ 431.381 Purpose and scope for electric motors.

This subpart describes violations of EPCA's energy conservation requirements, specific procedures we will follow in pursuing alleged non-compliance of an electric motor with an applicable energy conservation standard or labeling requirement, and general procedures for enforcement action, largely drawn directly from EPCA, that apply to electric motors.

[76 FR 12505, Mar. 7, 2011]

§ 431.382 Prohibited acts.

(a) Each of the following is a prohibited act under sections 332 and 345 of the Act:

(1) Distribution in commerce by a manufacturer or private labeler of any “new covered equipment” which is not labeled in accordance with an applicable labeling rule prescribed in accordance with Section 344 of the Act, and in this part;

(2) Removal from any “new covered equipment” or rendering illegible, by a manufacturer, distributor, retailer, or private labeler, of any label required under this part to be provided with such covered equipment;

(3) Failure to permit access to, or copying of records required to be supplied under the Act and this part, or

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failure to make reports or provide other information required to be supplied under the Act and this part;

(4) Advertisement of an electric motor or motors, by a manufacturer, distributor, retailer, or private labeler, in a catalog from which the equipment may be purchased, without including in the catalog all information as required by § 431.31(b)(1), provided, however, that this shall not apply to an advertisement of an electric motor in a catalog if distribution of the catalog began before the effective date of the labeling rule applicable to that motor;

(5) Failure of a manufacturer to supply at his expense a reasonable number of units of covered equipment to a test laboratory designated by the Secretary;

(6) Failure of a manufacturer to permit a representative designated by the Secretary to observe any testing required by the Act and this part, and to inspect the results of such testing; and

(7) Distribution in commerce by a manufacturer or private labeler of any new covered equipment which is not in compliance with an applicable energy efficiency standard prescribed under the Act and this part.

(b) In accordance with sections 333 and 345 of the Act, any person who knowingly violates any provision of paragraph (a) of this section may be subject to assessment of a civil penalty of no more than \$110 for each violation. Each violation of paragraphs (a)(1), (2), and (7) of this section shall constitute a separate violation with respect to each unit of any covered equipment, and each day of noncompliance with paragraphs (a)(3) through (6) of this section shall constitute a separate violation.

(c) For purposes of this section:

(1) The term “new covered equipment” means covered equipment the title of which has not passed to a purchaser who buys such product for purposes other than:

- (i) Reselling it; or
- (ii) Leasing it for a period in excess of one year; and

(2) The term “knowingly” means:

- (i) Having actual knowledge; or
- (ii) Presumed to have knowledge deemed to be possessed by a reasonable person who acts in the circumstances,

including knowledge obtainable upon the exercise of due care.

§ 431.383 Enforcement process for electric motors.

(a) *Test notice.* Upon receiving information in writing, concerning the energy performance of a particular electric motor sold by a particular manufacturer or private labeler, which indicates that the electric motor may not be in compliance with the applicable energy efficiency standard, or upon undertaking to ascertain the accuracy of the efficiency rating on the nameplate or in marketing materials for an electric motor, disclosed pursuant to subpart B of this part, the Secretary may conduct testing of that electric motor under this subpart by means of a test notice addressed to the manufacturer in accordance with the following requirements:

(1) The test notice procedure will only be followed after the Secretary or his/her designated representative has examined the underlying test data (or, where appropriate, data as to use of an alternative efficiency determination method) provided by the manufacturer and after the manufacturer has been offered the opportunity to meet with the Department to verify, as applicable, compliance with the applicable efficiency standard, or the accuracy of labeling information, or both. In addition, where compliance of a basic model was certified based on an AEDM, the Department shall have the discretion to pursue the provisions of § 431.17(a)(4)(iii) prior to invoking the test notice procedure. A representative designated by the Secretary shall be permitted to observe any re-verification procedures undertaken pursuant to this subpart, and to inspect the results of such re-verification.

(2) The test notice will be signed by the Secretary or his/her designee. The test notice will be mailed or delivered by the Department to the plant manager or other responsible official, as designated by the manufacturer.

(3) The test notice will specify the model or basic model to be selected for testing, the method of selecting the test sample, the date and time at which testing shall be initiated, the date by which testing is scheduled to

be completed and the facility at which testing will be conducted. The test notice may also provide for situations in which the specified basic model is unavailable for testing, and may include alternative basic models.

(4) The Secretary may require in the test notice that the manufacturer of an electric motor shall ship at his expense a reasonable number of units of a basic model specified in such test notice to a testing laboratory designated by the Secretary. The number of units of a basic model specified in a test notice shall not exceed 20.

(5) Within five working days of the time the units are selected, the manufacturer shall ship the specified test units of a basic model to the testing laboratory.

(b) *Testing laboratory.* Whenever the Department conducts enforcement testing at a designated laboratory in accordance with a test notice under this section, the resulting test data shall constitute official test data for that basic model. Such test data will be used by the Department to make a determination of compliance or non-compliance if a sufficient number of tests have been conducted to satisfy the requirements of appendix A of this subpart.

(c) *Sampling.* The determination that a manufacturer's basic model complies with its labeled efficiency, or the applicable energy efficiency standard, shall be based on the testing conducted in accordance with the statistical sampling procedures set forth in appendix A of this subpart and the test procedures set forth in appendix B to subpart B of this part.

(d) *Test unit selection.* A Department inspector shall select a batch, a batch sample, and test units from the batch sample in accordance with the provisions of this paragraph and the conditions specified in the test notice.

(1) The batch may be subdivided by the Department utilizing criteria specified in the test notice.

(2) A batch sample of up to 20 units will then be randomly selected from one or more subdivided groups within the batch. The manufacturer shall keep on hand all units in the batch sample until such time as the basic model is

determined to be in compliance or non-compliance.

(3) Individual test units comprising the test sample shall be randomly selected from the batch sample.

(4) All random selection shall be achieved by sequentially numbering all of the units in a batch sample and then using a table of random numbers to select the units to be tested.

(e) *Test unit preparation.* (1) Prior to and during the testing, a test unit selected in accordance with paragraph (d) of this section shall not be prepared, modified, or adjusted in any manner unless such preparation, modification, or adjustment is allowed by the applicable Department of Energy test procedure. One test shall be conducted for each test unit in accordance with the applicable test procedures prescribed in appendix B to subpart B of this part.

(2) No quality control, testing, or assembly procedures shall be performed on a test unit, or any parts and sub-assemblies thereof, that is not performed during the production and assembly of all other units included in the basic model.

(3) A test unit shall be considered defective if such unit is inoperative or is found to be in noncompliance due to failure of the unit to operate according to the manufacturer's design and operating instructions. Defective units, including those damaged due to shipping or handling, shall be reported immediately to the Department. The Department shall authorize testing of an additional unit on a case-by-case basis.

(f) *Testing at manufacturer's option.* (1) If a manufacturer's basic model is determined to be in noncompliance with the applicable energy performance standard at the conclusion of Department testing in accordance with the sampling plan specified in appendix A of this subpart, the manufacturer may request that the Department conduct additional testing of the basic model according to procedures set forth in appendix A of this subpart.

(2) All units tested under this paragraph shall be selected and tested in accordance with the provisions given in paragraphs (a) through (e) of this section.

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(3) The manufacturer shall bear the cost of all testing conducted under this paragraph.

(4) The manufacturer shall cease distribution of the basic model tested under the provisions of this paragraph from the time the manufacturer elects to exercise the option provided in this paragraph until the basic model is determined to be in compliance. The Department may seek civil penalties for all units distributed during such period.

(5) If the additional testing results in a determination of compliance, a notice of allowance to resume distribution shall be issued by the Department.

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§ 431.385 Cessation of distribution of a basic model of an electric motor.

(a) In the event that a model of an electric motor is determined non-compliant by the Department in accordance with § 431.192 or if a manufacturer or private labeler determines a model of an electric motor to be in non-compliance, then the manufacturer or private labeler shall:

(1) Immediately cease distribution in commerce of the basic model.

(2) Give immediate written notification of the determination of non-compliance, to all persons to whom the manufacturer has distributed units of the basic model manufactured since the date of the last determination of compliance.

(3) Pursuant to a request made by the Secretary, provide the Department within 30 days of the request, records, reports, and other documentation pertaining to the acquisition, ordering, storage, shipment, or sale of a basic model determined to be in noncompliance.

(4) The manufacturer may modify the non-compliant basic model in such manner as to make it comply with the applicable performance standard. Such modified basic model shall then be treated as a new basic model and must be certified in accordance with the provisions of this subpart; except that in addition to satisfying all requirements of this subpart, the manufacturer shall also maintain records that demonstrate that modifications have been

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made to all units of the new basic model prior to distribution in commerce.

(b) If a basic model is not properly certified in accordance with the requirements of this subpart, the Secretary may seek, among other remedies, injunctive action to prohibit distribution in commerce of such basic model.

§ 431.386 Remedies.

If the Secretary determines that a basic model of any covered equipment does not comply with an applicable energy conservation standard:

(a) The Secretary will notify the manufacturer, private labeler, or any other person as required, of this finding and of the Secretary's intent to seek a judicial order restraining further distribution in commerce of units of such a basic model unless the manufacturer, private labeler or other person as required, delivers, within 15 calendar days, a satisfactory statement to the Secretary, of the steps the manufacturer, private labeler or other person will take to insure that the noncompliant basic model will no longer be distributed in commerce. The Secretary will monitor the implementation of such statement.

(b) If the manufacturer, private labeler or any other person as required, fails to stop distribution of the non-compliant basic model, the Secretary may seek to restrain such violation in accordance with sections 334 and 345 of the Act.

(c) The Secretary will determine whether the facts of the case warrant the assessment of civil penalties for knowing violations in accordance with sections 333 and 345 of the Act.

§ 431.387 Hearings and appeals.

(a) Under sections 333(d) and 345 of the Act, before issuing an order assessing a civil penalty against any person, the Secretary must provide to such a person a notice of the proposed penalty. Such notice must inform the person that such person can choose (in writing within 30 days after receipt of the notice) to have the procedures of paragraph (c) of this section (in lieu of those in paragraph (b) of this section) apply with respect to such assessment.

(b)(1) Unless a person elects, within 30 calendar days after receipt of a notice under paragraph (a) of this section, to have paragraph (c) of this section apply with respect to the civil penalty under paragraph (a), the Secretary will assess the penalty, by order, after providing an opportunity for an agency hearing under 5 U.S.C. 554, before an administrative law judge appointed under 5 U.S.C. 3105, and making a determination of violation on the record. Such assessment order will include the administrative law judge's findings and the basis for such assessment.

(2) Any person against whom the Secretary assesses a penalty under this paragraph may, within 60 calendar days after the date of the order assessing such penalty, initiate action in the United States Court of Appeals for the appropriate judicial circuit for judicial review of such order in accordance with 5 U.S.C. chapter 7. The court will have jurisdiction to enter a judgment affirming, modifying, or setting aside in whole or in part, the order of the Secretary, or the court may remand the proceeding to the Secretary for such further action as the court may direct.

(c)(1) In the case of any civil penalty with respect to which the procedures of this paragraph have been elected, the Secretary will promptly assess such penalty, by order, after the date of the receipt of the notice under paragraph (a) of this section of the proposed penalty.

(2) If the person has not paid the civil penalty within 60 calendar days after the assessment has been made under paragraph (c)(1) of this section, the Secretary will institute an action in the appropriate District Court of the United States for an order affirming the assessment of the civil penalty. The court will have authority to review de novo the law and the facts involved and jurisdiction to enter a judgment enforcing, modifying, and enforcing as so modified, or setting aside in whole or in part, such assessment.

(3) Any election to have this paragraph apply can only be revoked with the consent of the Secretary.

(d) If any person fails to pay an assessment of a civil penalty after it has become a final and unappealable order under paragraph (b) of this section, or

after the appropriate District Court has entered final judgment in favor of the Secretary under paragraph (c) of this section, the Secretary will institute an action to recover the amount of such penalty in any appropriate District Court of the United States. In such action, the validity and appropriateness of such final assessment order or judgment will not be subject to review.

(e)(1) In accordance with the provisions of sections 333(d)(5)(A) and 345 of the Act and notwithstanding the provisions of title 28, United States Code, or Section 502(c) of the Department of Energy Organization Act, the General Counsel of the Department of Energy (or any attorney or attorneys within DOE designated by the Secretary) will represent the Secretary, and will supervise, conduct, and argue any civil litigation to which paragraph (c) of this section applies (including any related collection action under paragraph (d) of this section) in a court of the United States or in any other court, except the Supreme Court of the United States. However, the Secretary or the General Counsel will consult with the Attorney General concerning such litigation and the Attorney General will provide, on request, such assistance in the conduct of such litigation as may be appropriate.

(2) In accordance with the provisions of sections 333(d)(5)(B) and 345 of the Act, and subject to the provisions of Section 502(c) of the Department of Energy Organization Act, the Secretary will be represented by the Attorney General, or the Solicitor General, as appropriate, in actions under this section, except to the extent provided in paragraph (e)(1) of this section.

(3) In accordance with the provisions of Section 333(d)(5)(c) and 345 of the Act, Section 402(d) of the Department of Energy Organization Act will not apply with respect to the function of the Secretary under this section.

APPENDIX A TO SUBPART U OF PART 431—SAMPLING PLAN FOR ENFORCEMENT TESTING OF ELECTRIC MOTORS

Step 1. The first sample size (n_1) must be five or more units.

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Step 2. Compute the mean (\bar{X}_1) of the measured energy performance of the n_1 units in the first sample as follows:

$$\bar{X}_1 = \frac{1}{n_1} \sum_{i=1}^{n_1} X_i \quad (1)$$

where X_i is the measured full-load efficiency of unit i .

Step 3. Compute the sample standard deviation (S_1) of the measured full-load efficiency of the n_1 units in the first sample as follows:

$$S_1 = \sqrt{\frac{\sum_{i=1}^{n_1} (X_i - \bar{X}_1)^2}{n_1 - 1}} \quad (2)$$

Step 4. Compute the standard error ($SE(\bar{X}_1)$) of the mean full-load efficiency of the first sample as follows:

$$SE(\bar{X}_1) = \frac{S_1}{\sqrt{n_1}} \quad (3)$$

Step 5. Compute the lower control limit (LCL_1) for the mean of the first sample using RE as the desired mean as follows:

$$LCL_1 = RE - tSE(\bar{X}_1) \quad (4)$$

where: RE is the applicable EPCA nominal full-load efficiency when the test is to determine compliance with the applicable statutory standard, or is the labeled nominal full-load efficiency when the test is to determine compliance with the labeled efficiency value, and t is the 2.5th percentile of a t -distribution for a sample size of n_1 , which yields a 97.5 percent confidence level for a one-tailed t -test.

Step 6. Compare the mean of the first sample (\bar{X}_1) with the lower control limit (LCL_1) to determine one of the following:

(i) If the mean of the first sample is below the lower control limit, then the basic model is in non-compliance and testing is at an end.

(ii) If the mean is equal to or greater than the lower control limit, no final determination of compliance or non-compliance can be made; proceed to Step 7.

Step 7. Determine the recommended sample size (n) as follows:

$$n = \left\lceil \frac{tS_1(120 - 0.2RE)}{RE(20 - 0.2RE)} \right\rceil^2 \quad (5)$$

where S_1 , RE and t have the values used in Steps 3 and 5, respectively. The factor

$$\frac{120 - 0.2RE}{RE(20 - 0.2RE)}$$

is based on a 20 percent tolerance in the total power loss at full-load and fixed output power.

Given the value of n , determine one of the following:

(i) If the value of n is less than or equal to n_1 and if the mean energy efficiency of the first sample (\bar{X}_1) is equal to or greater than the lower control limit (LCL_1), the basic model is in compliance and testing is at an end.

(ii) If the value of n is greater than n_1 , the basic model is in non-compliance. The size of a second sample n_2 is determined to be the smallest integer equal to or greater than the difference $n - n_1$. If the value of n_2 so calculated is greater than $20 - n_1$, set n_2 equal to $20 - n_1$.

Step 8. Compute the combined (\bar{X}_2) mean of the measured energy performance of the n_1 and n_2 units of the combined first and second samples as follows:

$$\bar{X}_2 = \frac{1}{n_1 + n_2} \sum_{i=1}^{n_1 + n_2} X_i \quad (6)$$

Step 9. Compute the standard error ($SE(\bar{X}_2)$) of the mean full-load efficiency of the n_1 and n_2 units in the combined first and second samples as follows:

$$SE(\bar{X}_2) = \frac{S_1}{\sqrt{n_1 + n_2}} \quad (7)$$

(Note that S_1 is the value obtained above in Step 3.)

Step 10. Set the lower control limit (LCL_2) to,

$$LCL_2 = RE - tSE(\bar{X}_2) \quad (8) \sqrt{b^2 - 4ac}$$

where t has the value obtained in Step 5, and compare the combined sample mean (\bar{X}_2) to the lower control limit (LCL_2) to find one of the following:

(i) If the mean of the combined sample (\bar{X}_2) is less than the lower control limit (LCL_2), the basic model is in non-compliance and testing is at an end.

(ii) If the mean of the combined sample (\bar{X}_2) is equal to or greater than the lower control limit (LCL_2), the basic model is in compliance and testing is at an end.

MANUFACTURER-OPTION TESTING

If a determination of non-compliance is made in Steps 6, 7 or 10, of this appendix A, the manufacturer may request that additional testing be conducted, in accordance with the following procedures.

Step A. The manufacturer requests that an additional number, n_3 , of units be tested, with n_3 chosen such that $n_1 + n_2 + n_3$ does not exceed 20.

Step B. Compute the mean full-load efficiency, standard error, and lower control

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limit of the new combined sample in accordance with the procedures prescribed in Steps 8, 9, and 10, of this appendix A.

Step C. Compare the mean performance of the new combined sample to the lower control limit (LCL_2) to determine one of the following:

(a) If the new combined sample mean is equal to or greater than the lower control limit, the basic model is in compliance and testing is at an end.

(b) If the new combined sample mean is less than the lower control limit and the value of $n_1 + n_2 + n_3$ is less than 20, the manufacturer may request that additional units be tested. The total of all units tested may not exceed 20. Steps A, B, and C are then repeated.

(c) Otherwise, the basic model is determined to be in non-compliance.

Subpart V—General Provisions

SOURCE: 69 FR 61941, Oct. 21, 2004, unless otherwise noted. Redesignated at 70 FR 60417, Oct. 18, 2005.

§431.401 Petitions for waiver, and applications for interim waiver, of test procedure.

(a) *General criteria.* (1) Any interested person may submit a petition to waive for a particular basic model any requirements of §§431.16, 431.76, 431.86, 431.96, and 431.106 of this part, upon the grounds that either the basic model contains one or more design characteristics which prevent testing of the basic model according to the prescribed test procedures, or the prescribed test procedures may evaluate the basic model in a manner so unrepresentative of its true energy consumption characteristics as to provide materially inaccurate comparative data.

(2) Any person who has submitted a Petition for Waiver as provided in this subpart, may also file an Application for Interim Waiver of the applicable test procedure requirements.

(b) *Submission, content, and publication.* (1) A Petition for Waiver shall be submitted either electronically to AS_Waiver_Requests@ee.doe.gov or by mail, in triplicate, to U.S. Department of Energy, Building Technologies Program, Test Procedure Waiver, 1000 Independence Avenue, SW., Mailstop EE-2J, Washington, DC 20585-0121. Each Petition for Waiver shall:

(i) Identify the particular basic model(s) for which a waiver is requested, the design characteristic(s) constituting the grounds for the petition, and the specific requirements sought to be waived, and must discuss in detail the need for the requested waiver;

(ii) Identify manufacturers of all other basic models marketed in the United States and known to the petitioner to incorporate similar design characteristic(s);

(iii) Include any alternate test procedures known to the petitioner to evaluate the characteristics of the basic model in a manner representative of its energy consumption; and

(iv) Be signed by you or by an authorized representative. In accordance with the provisions set forth in 10 CFR 1004.11, any request for confidential treatment of any information contained in a Petition for Waiver or in supporting documentation must be accompanied by a copy of the petition, application or supporting documentation from which the information claimed to be confidential has been deleted. DOE will publish in the FEDERAL REGISTER the petition and supporting documents from which confidential information, as determined by DOE, has been deleted in accordance with 10 CFR 1004.11 and will solicit comments, data and information with respect to the determination of the petition.

(2) You must submit any Application for Interim Waiver in triplicate, with the required three copies of the Petition for Waiver, to the Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy. Each Application for Interim Waiver must reference the Petition for Waiver by identifying the particular basic model(s) for which you seek a waiver and temporary exception. Each Application for Interim Waiver must demonstrate likely success of the Petition for Waiver and address what economic hardship and/or competitive disadvantage is likely to result absent a favorable determination on the Application for Interim Waiver. You or an authorized representative must sign the Application for Interim Waiver.

(c) *Notification to other manufacturers.* (1) After filing a Petition for Waiver

with DOE, and after DOE has published the Petition for Waiver in the FEDERAL REGISTER, you must, within five working days of such publication, notify in writing all known manufacturers of domestically marketed units of the same product type (as defined in Section 340(1) of the Act) and must include in the notice a statement that DOE has published in the FEDERAL REGISTER on a certain date the Petition for Waiver and supporting documents from which confidential information, if any, as determined by DOE, has been deleted in accordance with 10 CFR 1004.11. In complying with the requirements of this paragraph, you must file with DOE a statement certifying the names and addresses of each person to whom you have sent a notice of the Petition for Waiver.

(2) If you apply for Interim Waiver, whether filing jointly with or subsequent to your Petition for Waiver with DOE, you must concurrently notify in writing all known manufacturers of domestically marketed units of the same product type (as defined in Section 340(1) of the Act), and must include in the notice a copy of the Petition for Waiver and a copy of the Application for Interim Waiver. In complying with this section, you must in the written notification include a statement that the Assistant Secretary for Energy Efficiency and Renewable Energy will receive and consider timely written comments on the Application for Interim Waiver. Upon filing an Application for Interim Waiver, you must in complying with the requirements of this paragraph certify to DOE that a copy of these documents has been sent to all known manufacturers of domestically marketed units of the same product type (as listed in Section 340(1) of the Act). Such certification must include the names and addresses of such persons. You must comply with the provisions of paragraph (c)(1) of this Section with respect to the petition for waiver.

(d) *Comments; responses to comments.* (1) Any person submitting written comments to DOE with respect to an Application for Interim Waiver must also send a copy of the comments to the applicant.

(2) Any person submitting written comments to DOE with the respect to a

Petition for Waiver must also send a copy of such comments to the petitioner. In accordance with paragraph (b)(1) of this section, a petitioner may submit a rebuttal statement to the Assistant Secretary for Energy Efficiency and Renewable Energy.

(e) *Provisions specific to interim waivers—(1) Disposition of application.* If administratively feasible, DOE will notify the applicant in writing of the disposition of the Application for Interim Waiver within 15 business days of receipt of the application. Notice of DOE's determination on the Application for Interim Waiver will be published in the FEDERAL REGISTER.

(2) *Consequences of filing application.* The filing of an Application for Interim Waiver will not constitute grounds for noncompliance with any requirements of this subpart, until an Interim Waiver has been granted.

(3) *Criteria for granting.* The Assistant Secretary for Energy Efficiency and Renewable Energy will grant an Interim Waiver from test procedure requirements if he or she determines that the applicant will experience economic hardship if the Application for Interim Waiver is denied, if it appears likely that the Petition for Waiver will be granted, and/or if the Assistant Secretary determines that it would be desirable for public policy reasons to grant immediate relief pending a determination on the Petition for Waiver.

(4) *Duration.* An interim waiver will terminate 180 days after issuance or upon the determination on the Petition for Waiver, whichever occurs first. DOE may extend an interim waiver for up to 180 days or modify its terms based on relevant information contained in the record and any comments received subsequent to issuance of the interim waiver. DOE will publish in the FEDERAL REGISTER notice of such extension and/or any modification of the terms or duration of the interim waiver.

(f) *Provisions specific to waivers—(1) Rebuttal by petitioner.* Following publication of the Petition for Waiver in the FEDERAL REGISTER, a petitioner may, within 10 working days of receipt of a copy of any comments submitted in accordance with paragraph (b)(1) of this section, submit a rebuttal statement to

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the Assistant Secretary for Energy Efficiency and Renewable Energy. A petitioner may rebut more than one response in a single rebuttal statement.

(2) *Disposition of petition.* DOE will notify the petitioner in writing as soon as practicable of the disposition of each Petition for Waiver. The Assistant Secretary for Energy Efficiency and Renewable Energy will issue a decision on the petition as soon as is practicable following receipt and review of the Petition for Waiver and other applicable documents, including, but not limited to, comments and rebuttal statements.

(3) *Consequence of filing petition.* The filing of a Petition for Waiver will not constitute grounds for noncompliance with any requirements of this subpart, until a waiver or interim waiver has been granted.

(4) *Granting: criteria, conditions, and publication.* The Assistant Secretary for Energy Efficiency and Renewable Energy will grant a waiver if he or she determines that either the basic model for which the waiver was requested contains a design characteristic which prevents testing of the basic model according to the prescribed test procedures, or the prescribed test procedures may evaluate the basic model in a manner so unrepresentative of its true energy consumption characteristics as to provide materially inaccurate comparative data. The Assistant Secretary for Energy Efficiency and Renewable Energy may grant a waiver subject to conditions, which may include adherence to alternate test procedures. DOE will promptly publish in the FEDERAL REGISTER notice of each waiver granted or denied, and any limiting conditions of each waiver granted.

(g) *Revision of regulation.* Within one year of the granting of any waiver, the Department will publish in the FEDERAL REGISTER a notice of proposed rulemaking to amend our regulations so as to eliminate any need for the continuation of such waiver. As soon thereafter as practicable, the Department will publish in the FEDERAL REGISTER a final rule. Such waiver will terminate on the effective date of such final rule.

(h) *Exhaustion of remedies.* In order to exhaust administrative remedies, any person aggrieved by an action under

this Section must file an appeal with the DOE's Office of Hearings and Appeals as provided in 10 CFR part 1003, subpart C.

[69 FR 61941, Oct. 21, 2004, as amended at 76 FR 12505, Mar. 7, 2011]

§ 431.402 Preemption of State regulations for commercial HVAC & WH products.

Beginning on the effective date of such standard, an energy conservation standard set forth in this part for a commercial HVAC & WH product supersedes any State or local regulation concerning the energy efficiency or energy use of that product, except as provided for in Section 345(b)(2)(B)–(D) of the Act.

§ 431.403 Maintenance of records for electric motors.

(a) Manufacturers of electric motors must establish, maintain and retain records of the following:

(1) The test data for all testing conducted pursuant to this part;

(2) The development, substantiation, application, and subsequent verification of any AEDM used under this part;

(3) Any written certification received from a certification program, including a certificate or conformity, relied on under the provisions of this part;

(b) You must organize such records and index them so that they are readily accessible for review. The records must include the supporting test data associated with tests performed on any test units to satisfy the requirements of this part (except tests performed by DOE).

(c) For each basic model, you must retain all such records for a period of two years from the date that production of all units of that basic model has ceased. You must retain records in a form allowing ready access to DOE, upon request.

[76 FR 12505, Mar. 7, 2011]

§ 431.404 Imported electric motors.

(a) Under sections 331 and 345 of the Act, any person importing an electric motor into the United States must comply with the provisions of the Act

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and of this part, and is subject to the remedies of this part.

(b) Any electric motor offered for importation in violation of the Act and of this part will be refused admission into the customs territory of the United States under rules issued by the Secretary of the Treasury, except that the Secretary of the Treasury may, by such rules, authorize the importation of such electric motor upon such terms and conditions (including the furnishing of a bond) as may appear to the Secretary of the Treasury appropriate to ensure that such electric motor will not violate the Act and this part, or will be exported or abandoned to the United States.

[76 FR 12505, Mar. 7, 2011]

§ 431.405 Exported electric motors.

Under Sections 330 and 345 of the Act, this part does not apply to any electric motor if:

(a) Such electric motor is manufactured, sold, or held for sale for export from the United States (or such electric motor was imported for export), unless such electric motor is, in fact, distributed in commerce for use in the United States; and,

(b) Such electric motor, when distributed in commerce, or any container in which it is enclosed when so distributed, bears a stamp or label stating that such electric motor is intended for export.

[76 FR 12505, Mar. 7, 2011]

§ 431.406 Subpoena—Electric Motors.

Pursuant to sections 329(a) and 345 of the Act, for purposes of carrying out this part, the Secretary or the Secretary's designee, may sign and issue subpoenas for the attendance and testimony of witnesses and the production of relevant books, records, papers, and other documents, and administer the oaths. Witnesses summoned under the provisions of this section shall be paid the same fees and mileage as are paid to witnesses in the courts of the United States. In case of contumacy by, or refusal to obey a subpoena served upon any persons subject to this part, the Secretary may seek an order from the District Court of the United States for any District in which such person is

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found or resides or transacts business requiring such person to appear and give testimony, or to appear and produce documents. Failure to obey such order is punishable by such court as a contempt thereof.

[76 FR 12505, Mar. 7, 2011]

§ 431.407 Confidentiality—Electric Motors.

Pursuant to the provisions of 10 CFR 1004.11, any manufacturer or private labeler of electric motors submitting information or data which they believe to be confidential and exempt from public disclosure should submit one complete copy, and 15 copies from which the information believed to be confidential has been deleted. In accordance with the procedures established at 10 CFR 1004.11, the Department shall make its own determination with regard to any claim that information submitted be exempt from public disclosure.

[76 FR 12505, Mar. 7, 2011]

§ 431.408 Preemption of State regulations for covered equipment other than electric motors and commercial heating, ventilating, air-conditioning and water heating products.

This section concerns State regulations providing for any energy conservation standard, or water conservation standard (in the case of commercial prerinse spray valves or commercial clothes washers), or other requirement with respect to the energy efficiency, energy use, or water use (in the case of commercial prerinse spray valves or commercial clothes washers), for any covered equipment other than an electric motor or commercial HVAC and WH product. Any such regulation that contains a standard or requirement that is not identical to a Federal standard in effect under this subpart is preempted by that standard, except as provided for in sections 327(b) and (c) and 345(e), (f) and (g) of the Act.

[75 FR 675, Jan. 5, 2010]

Subpart W—Petitions To Exempt State Regulation From Preemption; Petitions To Withdraw Exemption of State Regulation

SOURCE: 69 FR 61941, Oct. 21, 2004, unless otherwise noted. Redesignated at 70 FR 60417, Oct. 18, 2005.

§ 431.421 Purpose and scope.

(a) The regulations in this subpart prescribe the procedures to be followed in connection with petitions requesting a rule that a State regulation prescribing an energy conservation standard or other requirement respecting energy use or energy efficiency of a type (or class) of covered equipment not be preempted.

(b) The regulations in this subpart also prescribe the procedures to be followed in connection with petitions to withdraw a rule exempting a State regulation prescribing an energy conservation standard or other requirement respecting energy use or energy efficiency of a type (or class) of covered equipment.

§ 431.422 Prescriptions of a rule.

(a) *Criteria for exemption from preemption.* Upon petition by a State which has prescribed an energy conservation standard or other requirement for a type or class of covered equipment for which a Federal energy conservation standard is applicable, the Secretary shall prescribe a rule that such standard not be preempted if he/she determines that the State has established by a preponderance of evidence that such requirement is needed to meet unusual and compelling State or local energy interests. For the purposes of this regulation, the term “unusual and compelling State or local energy interests” means interests which are substantially different in nature or magnitude from those prevailing in the U.S. generally, and are such that when evaluated within the context of the State’s energy plan and forecast, the costs, benefits, burdens, and reliability of energy savings resulting from the State regulation make such regulation preferable or necessary when measured against the costs, benefits, burdens,

and reliability of alternative approaches to energy savings or production, including reliance on reasonably predictable market-induced improvements in efficiency of all equipment subject to the State regulation. The Secretary may not prescribe such a rule if he finds that interested persons have established, by a preponderance of the evidence, that the State’s regulation will significantly burden manufacturing, marketing, distribution, sale or servicing of the covered equipment on a national basis. In determining whether to make such a finding, the Secretary shall evaluate all relevant factors including: The extent to which the State regulation will increase manufacturing or distribution costs of manufacturers, distributors, and others; the extent to which the State regulation will disadvantage smaller manufacturers, distributors, or dealers or lessen competition in the sale of the covered equipment in the State; the extent to which the State regulation would cause a burden to manufacturers to redesign and produce the covered equipment type (or class), taking into consideration the extent to which the regulation would result in a reduction in the current models, or in the projected availability of models, that could be shipped on the effective date of the regulation to the State and within the U.S., or in the current or projected sales volume of the covered equipment type (or class) in the State and the U.S.; and the extent to which the State regulation is likely to contribute significantly to a proliferation of State commercial and industrial equipment efficiency requirements and the cumulative impact such requirements would have. The Secretary may not prescribe such a rule if he/she finds that such a rule will result in the unavailability in the State of any covered equipment (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the State at the time of the Secretary’s finding. The failure of some classes (or types) to meet this criterion shall not affect the Secretary’s determination of whether to prescribe a rule for other classes (or types).

(1) Requirements of petition for exemption from preemption. A petition from a State for a rule for exemption from preemption shall include the information listed in paragraphs (a)(1)(i) through (a)(1)(vi) of this section. A petition for a rule and correspondence relating to such petition shall be available for public review except for confidential or proprietary information submitted in accordance with the Department of Energy's Freedom of Information Regulations set forth in 10 CFR part 1004.

(i) The name, address, and telephone number of the petitioner;

(ii) A copy of the State standard for which a rule exempting such standard is sought;

(iii) A copy of the State's energy plan and forecast;

(iv) Specification of each type or class of covered equipment for which a rule exempting a standard is sought;

(v) Other information, if any, believed to be pertinent by the petitioner; and

(vi) Such other information as the Secretary may require.

(b) *Criteria for exemption from preemption when energy emergency conditions exist within State.* Upon petition by a State which has prescribed an energy conservation standard or other requirement for a type or class of covered equipment for which a Federal energy conservation standard is applicable, the Secretary may prescribe a rule, effective upon publication in the FEDERAL REGISTER, that such regulation not be preempted if he determines that in addition to meeting the requirements of paragraph (a) of this Section the State has established that: an energy emergency condition exists within the State that imperils the health, safety, and welfare of its residents because of the inability of the State or utilities within the State to provide adequate quantities of gas or electric energy to its residents at less than prohibitive costs; and cannot be substantially alleviated by the importation of energy or the use of interconnection agreements; and the State regulation is necessary to alleviate substantially such condition.

(1) Requirements of petition for exemption from preemption when energy

emergency conditions exist within a State. A petition from a State for a rule for exemption from preemption when energy emergency conditions exist within a State shall include the information listed in paragraphs (a)(1)(i) through (a)(1)(vi) of this section. A petition shall also include the information prescribed in paragraphs (b)(1)(i) through (b)(1)(iv) of this section, and shall be available for public review except for confidential or proprietary information submitted in accordance with the Department of Energy's Freedom of Information Regulations set forth in 10 CFR part 1004:

(i) A description of the energy emergency condition which exists within the State, including causes and impacts.

(ii) A description of emergency response actions taken by the State and utilities within the State to alleviate the emergency condition;

(iii) An analysis of why the emergency condition cannot be alleviated substantially by importation of energy or the use of interconnection agreements;

(iv) An analysis of how the State standard can alleviate substantially such emergency condition.

(c) *Criteria for withdrawal of a rule exempting a State standard.* Any person subject to a State standard which, by rule, has been exempted from Federal preemption and which prescribes an energy conservation standard or other requirement for a type or class of covered equipment, when the Federal energy conservation standard for such equipment subsequently is amended, may petition the Secretary requesting that the exemption rule be withdrawn. The Secretary shall consider such petition in accordance with the requirements of paragraph (a) of this section, except that the burden shall be on the petitioner to demonstrate that the exemption rule received by the State should be withdrawn as a result of the amendment to the Federal standard. The Secretary shall withdraw such rule if he determines that the petitioner has shown the rule should be withdrawn.

(1) Requirements of petition to withdraw a rule exempting a State standard. A petition for a rule to withdraw a rule exempting a State standard shall

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include the information prescribed in paragraphs (c)(1)(i) through (c)(1)(vii) of this section, and shall be available for public review, except for confidential or proprietary information submitted in accordance with the Department of Energy's Freedom of Information Regulations set forth in 10 CFR part 1004:

- (i) The name, address and telephone number of the petitioner;
- (ii) A statement of the interest of the petitioner for which a rule withdrawing an exemption is sought;
- (iii) A copy of the State standard for which a rule withdrawing an exemption is sought;
- (iv) Specification of each type or class of covered equipment for which a rule withdrawing an exemption is sought;
- (v) A discussion of the factors contained in paragraph (a) of this section;
- (vi) Such other information, if any, believed to be pertinent by the petitioner; and
- (vii) Such other information as the Secretary may require.

(2) [Reserved]

§ 431.423 Filing requirements.

(a) *Service.* All documents required to be served under this subpart shall, if mailed, be served by first class mail. Service upon a person's duly authorized representative shall constitute service upon that person.

(b) *Obligation to supply information.* A person or State submitting a petition is under a continuing obligation to provide any new or newly discovered information relevant to that petition. Such information includes, but is not limited to, information regarding any other petition or request for action subsequently submitted by that person or State.

(c) *The same or related matters.* A person or State submitting a petition or other request for action shall state whether to the best knowledge of that petitioner the same or related issue, act, or transaction has been or presently is being considered or investigated by any State agency, department, or instrumentality.

(d) *Computation of time.* (1) Computing any period of time prescribed by or allowed under this subpart, the day of

the action from which the designated period of time begins to run is not to be included. If the last day of the period is Saturday, or Sunday, or Federal legal holiday, the period runs until the end of the next day that is neither a Saturday, or Sunday or Federal legal holiday.

(2) Saturdays, Sundays, and intervening Federal legal holidays shall be excluded from the computation of time when the period of time allowed or prescribed is 7 days or less.

(3) When a submission is required to be made within a prescribed time, DOE may grant an extension of time upon good cause shown.

(4) Documents received after regular business hours are deemed to have been submitted on the next regular business day. Regular business hours for the DOE's National Office, Washington, DC, are 8:30 a.m. to 4:30 p.m.

(5) DOE reserves the right to refuse to accept, and not to consider, untimely submissions.

(e) *Filing of petitions.* (1) A petition for a rule shall be submitted in triplicate to: The Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy, Section 327 Petitions, Building Technologies, EE-2J, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585.

(2) A petition may be submitted on behalf of more than one person. A joint petition shall indicate each person participating in the submission. A joint petition shall provide the information required by § 431.212 for each person on whose behalf the petition is submitted.

(3) All petitions shall be signed by the person(s) submitting the petition or by a duly authorized representative. If submitted by a duly authorized representative, the petition shall certify this authorization.

(4) A petition for a rule to withdraw a rule exempting a State regulation, all supporting documents, and all future submissions shall be served on each State agency, department, or instrumentality whose regulation the petitioner seeks to supersede. The petition shall contain a certification of this service which states the name and mailing address of the served parties, and the date of service.

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(f) *Acceptance for filing.* (1) Within 15 days of the receipt of a petition, the Secretary will either accept it for filing or reject it, and the petitioner will be so notified in writing. The Secretary will serve a copy of this notification on each other party served by the petitioner. Only such petitions which conform to the requirements of this subpart and which contain sufficient information for the purposes of a substantive decision will be accepted for filing. Petitions which do not so conform will be rejected and an explanation provided to petitioner in writing.

(2) For purposes of the Act and this subpart, a petition is deemed to be filed on the date it is accepted for filing.

(g) *Docket.* A petition accepted for filing will be assigned an appropriate docket designation. Petitioner shall use the docket designation in all subsequent submissions.

§ 431.424 Notice of petition.

(a) Promptly after receipt of a petition and its acceptance for filing, notice of such petition shall be published in the FEDERAL REGISTER. The notice shall set forth the availability for public review of all data and information available, and shall solicit comments, data and information with respect to the determination on the petition. Except as may otherwise be specified, the period for public comment shall be 60 days after the notice appears in the FEDERAL REGISTER.

(b) In addition to the material required under paragraph (a) of this section, each notice shall contain a summary of the State regulation at issue and the petitioner's reasons for the rule sought.

§ 431.425 Consolidation.

DOE may consolidate any or all matters at issue in two or more proceedings docketed where there exist common parties, common questions of fact and law, and where such consolidation would expedite or simplify consideration of the issues. Consolidation shall not affect the right of any party to raise issues that could have been raised if consolidation had not occurred.

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§ 431.426 Hearing.

The Secretary may hold a public hearing, and publish notice in the FEDERAL REGISTER of the date and location of the hearing, when he determines that such a hearing is necessary and likely to result in a timely and effective resolution of the issues. A transcript shall be kept of any such hearing.

§ 431.427 Disposition of petitions.

(a) After the submission of public comments under § 431.213(a), the Secretary shall prescribe a final rule or deny the petition within 6 months after the date the petition is filed.

(b) The final rule issued by the Secretary or a determination by the Secretary to deny the petition shall include a written statement setting forth his findings and conclusions, and the reasons and basis therefor. A copy of the Secretary's decision shall be sent to the petitioner and the affected State agency. The Secretary shall publish in the FEDERAL REGISTER a notice of the final rule granting or denying the petition and the reasons and basis therefor.

(c) If the Secretary finds that he cannot issue a final rule within the 6-month period pursuant to paragraph (a) of this section, he shall publish a notice in the FEDERAL REGISTER extending such period to a date certain, but no longer than one year after the date on which the petition was filed. Such notice shall include the reasons for the delay.

§ 431.428 Effective dates of final rules.

(a) A final rule exempting a State standard from Federal preemption will be effective:

(1) Upon publication in the FEDERAL REGISTER if the Secretary determines that such rule is needed to meet an "energy emergency condition" within the State;

(2) Three years after such rule is published in the FEDERAL REGISTER; or

(3) Five years after such rule is published in the FEDERAL REGISTER if the Secretary determines that such additional time is necessary due to the burdens of retooling, redesign or distribution.

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(b) A final rule withdrawing a rule exempting a State standard will be effective upon publication in the FEDERAL REGISTER.

§ 431.429 Request for reconsideration.

(a) Any petitioner whose petition for a rule has been denied may request reconsideration within 30 days of denial. The request shall contain a statement of facts and reasons supporting reconsideration and shall be submitted in writing to the Secretary.

(b) The denial of a petition will be reconsidered only where it is alleged and demonstrated that the denial was based on error in law or fact and that evidence of the error is found in the record of the proceedings.

(c) If the Secretary fails to take action on the request for reconsideration within 30 days, the request is deemed denied, and the petitioner may seek such judicial review as may be appropriate and available.

(d) A petitioner has not exhausted other administrative remedies until a request for reconsideration has been filed and acted upon or deemed denied.

§ 431.430 Finality of decision.

(a) A decision to prescribe a rule that a State energy conservation standard or other requirement not be preempted is final on the date the rule is issued, *i.e.*, signed by the Secretary. A decision to prescribe such a rule has no effect on other regulations of covered equipment of any other State.

(b) A decision to prescribe a rule withdrawing a rule exempting a State standard or other requirement is final on the date the rule is issued, *i.e.*, signed by the Secretary. A decision to deny such a petition is final on the day a denial of a request for reconsideration is issued, *i.e.*, signed by the Secretary.

Subpart X—Small Electric Motors

SOURCE: 74 FR 32072, July 7, 2009, unless otherwise noted.

§ 431.441 Purpose and scope.

This subpart contains definitions, test procedures, and energy conservation requirements for small electric motors, pursuant to Part A-1 of Title

III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311–6317. This subpart does not cover “electric motors,” which are addressed in subpart B of this part.

[77 FR 26638, May 4, 2012]

§ 431.442 Definitions.

The following definitions are applicable to this subpart:

Alternative efficiency determination method, or AEDM, means, with respect to a small electric motor, a method of calculating the total power loss and average full-load efficiency.

Average full-load efficiency means the arithmetic mean of the full-load efficiencies of a population of small electric motors of duplicate design, where the full-load efficiency of each motor in the population is the ratio (expressed as a percentage) of the motor's useful power output to its total power input when the motor is operated at its full rated load, rated voltage, and rated frequency.

Basic model means, with respect to a small electric motor, all units of a given type of small electric motor (or class thereof) manufactured by a single manufacturer, and which have the same rating, have electrical characteristics that are essentially identical, and do not have any differing physical or functional characteristics that affect energy consumption or efficiency. For the purpose of this definition, “rating” means a combination of the small electric motor's group (*i.e.*, capacitor-start, capacitor-run; capacitor-start, induction-run; or polyphase), horsepower rating (or standard kilowatt equivalent), and number of poles with respect to which § 431.446 prescribes nominal full load efficiency standards.

CSA means Canadian Standards Association.

DOE or *the Department* means the U.S. Department of Energy.

EPCA means the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6291–6317.

IEC means International Electrotechnical Commission.

IEEE means Institute of Electrical and Electronics Engineers, Inc.

NEMA means National Electrical Manufacturers Association.

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Small electric motor means a NEMA general purpose alternating current single-speed induction motor, built in a two-digit frame number series in accordance with NEMA Standards Publication MG1-1987, including IEC metric equivalent motors.

[74 FR 32072, July 7, 2009, as amended at 77 FR 26638, May 4, 2012]

TEST PROCEDURES

§ 431.443 Materials incorporated by reference.

(a) *General.* The Department incorporates by reference the following standards into subpart X of part 431. The Director of the Federal Register has approved the material listed in paragraph (b) of this section for incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to a standard by the standard-setting organization will not affect the DOE test procedures unless and until the DOE amends its test procedures. DOE incorporates the material as it exists on the date of the approval and a notice of any change in the material will be published in the FEDERAL REGISTER. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html. Also, this material is available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, (202) 586-2945, or go to http://www1.eere.energy.gov/buildings/appliance_standards/. Standards can be obtained from the sources below.

(b) *CAN/CSA.* Canadian Standards Association, Sales Department, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, L4W 5N6, Canada, 1-800-463-6727, or go to <http://www.shopcsa.ca/onlinestore/welcome.asp>.

(1) CSA C747-09 ("CSA C747"), Energy efficiency test methods for small motors, October 2009, IBR approved for §§ 431.444; 431.447.

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(2) CSA C390-10, Test methods, marking requirements, and energy efficiency levels for three-phase induction motors, March 2010, IBR approved for §§ 431.444; 431.447.

(c) *IEEE.* Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, 1-800-678-IEEE (4333), or go to <http://www.ieee.org/web/publications/home/index.html>.

(1) IEEE Std 112-2004, Test Procedure for Polyphase Induction Motors and Generators, approved February 9, 2004, IBR approved as follows:

(i) Section 6.3, Efficiency Test Method A, Input-Output, IBR approved for §§ 431.444; 431.447;

(ii) Section 6.4, Efficiency Test Method B, Input-Output with Loss Segregation, IBR approved for §§ 431.444; 431.447.

(2) IEEE Std 114-2010, Test Procedure for Single-Phase Induction Motors, approved September 30, 2010, IBR approved for §§ 431.444; 431.447.

[74 FR 32072, July 7, 2009, as amended at 77 FR 26638, May 4, 2012]

§ 431.444 Test procedures for the measurement of energy efficiency.

(a) *Scope.* Pursuant to section 346(b)(1) of EPCA, this section provides the test procedures for measuring, pursuant to EPCA, the efficiency of small electric motors pursuant to EPCA. (42 U.S.C. 6317(b)(1)) For purposes of this part 431 and EPCA, the test procedures for measuring the efficiency of small electric motors shall be the test procedures specified in § 431.444(b).

(b) *Testing and Calculations.* Determine the energy efficiency and losses by using one of the following test methods:

(1) Single-phase small electric motors: Either IEEE Std 114-2010 or CSA C747 (incorporated by reference, see § 431.443);

(2) Polyphase small electric motors less than or equal to 1 horsepower (0.75 kW): Either IEEE Std 112-2004 Test Method A or CSA C747 (incorporated by reference, see § 431.443); or

(3) Polyphase small electric motors greater than 1 horsepower (0.75 kW): Either IEEE Std 112-2004 Test Method

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B or CSA C390-10 (incorporated by reference, see § 431.443).

[74 FR 32072, July 7, 2009, as amended at 77 FR 26638, May 4, 2012]

§ 431.445 Determination of small electric motor efficiency.

(a) *Scope.* When a party determines the energy efficiency of a small electric motor to comply with an obligation imposed on it by or pursuant to Part A-1 of Title III of EPCA, 42 U.S.C. 6311-6317, this section applies.

(b) *Provisions applicable to all small electric motors—*(1) *General requirements.* The average full-load efficiency of each basic model of small electric motor must be determined either by testing in accordance with § 431.444 of this subpart, or by application of an alternative efficiency determination method (AEDM) that meets the requirements of paragraphs (a)(2) and (3) of this section, provided, however, that an AEDM may be used to determine the average full-load efficiency of one or more of a manufacturer's basic models only if the average full-load efficiency of at least five of its other basic models is determined through testing.

(2) *Alternative efficiency determination method.* An AEDM applied to a basic model must be:

(i) Derived from a mathematical model that represents the mechanical and electrical characteristics of that basic model, and

(ii) Based on engineering or statistical analysis, computer simulation or modeling, or other analytic evaluation of performance data.

(3) *Substantiation of an alternative efficiency determination method.* Before an AEDM is used, its accuracy and reliability must be substantiated as follows:

(i) The AEDM must be applied to at least five basic models that have been tested in accordance with § 431.444; and

(ii) The predicted total power loss for each such basic model, calculated by applying the AEDM, must be within plus or minus 10 percent of the mean total power loss determined from the testing of that basic model.

(4) *Subsequent verification of an AEDM.* (i) Each manufacturer that has used an AEDM under this section shall have available for inspection by the

Department of Energy records showing the method or methods used; the mathematical model, the engineering or statistical analysis, computer simulation or modeling, and other analytic evaluation of performance data on which the AEDM is based; complete test data, product information, and related information that the manufacturer has generated or acquired pursuant to paragraph (a)(3) of this section; and the calculations used to determine the efficiency and total power losses of each basic model to which the AEDM was applied.

(ii) If requested by the Department, the manufacturer shall conduct simulations to predict the performance of particular basic models of small electric motors specified by the Department, analyses of previous simulations conducted by the manufacturer, sample testing of basic models selected by the Department, or a combination of the foregoing.

(5) *Use of a certification program.* (i) A manufacturer may use a certification program, that DOE has classified as nationally recognized under § 431.447, to certify the average full-load efficiency of a basic model of small electric motor, and issue a certificate of conformity for the small electric motor.

(ii) For each basic model for which a certification program is not used as described in paragraph (b)(5)(i) of this section, any testing of a motor to determine its energy efficiency must be carried out in accordance with paragraph (c) of this section.

(c) *Additional testing requirements applicable when a certification program is not used—*(1) *Selection of basic models for testing.* (i) Basic models must be selected for testing in accordance with the following criteria:

(A) Two of the basic models must be among the five basic models that have the highest unit volumes of production by the manufacturer in the prior year, or during the prior 12 calendar month period beginning in 2015, whichever is later, and comply with the standards set forth in § 431.446;

(B) The basic models should be of different horsepower without duplication;

(C) At least one basic model should be selected from each of the frame

number series for which the manufacturer is seeking compliance; and

(D) Each basic model should have the lowest average full-load efficiency among the basic models with the same rating (“rating” as used here has the same meaning as it has in the definition of “basic model”).

(ii) In any instance where it is impossible for a manufacturer to select basic models for testing in accordance with all of these criteria, the criteria shall be given priority in the order in which they are listed. Within the limits imposed by the criteria, basic models shall be selected randomly.

(2) *Selection of units for testing within a basic model.* For each basic model selected for testing,¹ a sample of units shall be selected at random and tested. The sample shall be comprised of production units of the basic model, or units that are representative of such production units. The sample size shall be no fewer than five units, except when fewer than five units of a basic model would be produced over a reasonable period of time (approximately 180 days). In such cases, each unit produced shall be tested.

(3) *Applying results of testing.* When applying the test results to determine whether a motor complies with the required average efficiency level:

The average full-load efficiency of the sample, \bar{X} which is defined by

$$\bar{X} = \frac{1}{n} \sum_{i=1}^n X_i$$

where X_i is the measured full-load efficiency of unit i and n is the number of units tested, shall satisfy the condition:

$$\bar{X} \geq \frac{100}{1 + 1.05 \left(\frac{100}{RE} - 1 \right)}$$

where RE is the required average full-load efficiency.

[74 FR 32072, July 7, 2009, as amended at 77 FR 26638, May 4, 2012]

¹Components of similar design may be substituted without requiring additional testing if the represented measures of energy consumption continue to satisfy the applicable sampling provision.

ENERGY CONSERVATION STANDARDS

§ 431.446 Small electric motors energy conservation standards and their effective dates.

(a) Each small electric motor manufactured (alone or as a component of another piece of non-covered equipment) after March 9, 2015, or in the case of a small electric motor which requires listing or certification by a nationally recognized safety testing laboratory, after March 9, 2017, shall have an average full load efficiency of not less than the following:

Motor horsepower/standard kilowatt equivalent	Average full load efficiency		
	Polyphase		
	Open motors (number of poles)		
	6	4	2
0.25/0.18	67.5	69.5	65.6
0.33/0.25	71.4	73.4	69.5
0.5/0.37	75.3	78.2	73.4
0.75/0.55	81.7	81.1	76.8
1/0.75	82.5	83.5	77.0
1.5/1.1	83.8	86.5	84.0
2/1.5	N/A	86.5	85.5
3/2.2	N/A	86.9	85.5

Motor horsepower/standard kilowatt equivalent	Average full load efficiency		
	Capacitor-start capacitor-run and capacitor-start induction-run		
	Open motors (number of poles)		
	6	4	2
0.25/0.18	62.2	68.5	66.6
0.33/0.25	66.6	72.4	70.5
0.5/0.37	76.2	76.2	72.4
0.75/0.55	80.2	81.8	76.2
1/0.75	81.1	82.6	80.4
1.5/1.1	N/A	83.8	81.5
2/1.5	N/A	84.5	82.9
3/2.2	N/A	N/A	84.1

(b) For purposes of determining the required minimum average full load efficiency of an electric motor that has a horsepower or kilowatt rating between two horsepower or two kilowatt ratings listed in any table of efficiency standards in paragraph (a) of this section, each such motor shall be deemed to have a listed horsepower or kilowatt rating, determined as follows:

(1) A horsepower at or above the midpoint between the two consecutive horsepower ratings shall be rounded up to the higher of the two horsepower ratings;

(2) A horsepower below the midpoint between the two consecutive horsepower ratings shall be rounded down to

the lower of the two horsepower ratings; or

(3) A kilowatt rating shall be directly converted from kilowatts to horsepower using the formula 1 kilowatt = (1/0.746) hp, without calculating beyond three significant decimal places, and the resulting horsepower shall be rounded in accordance with paragraphs (b)(1) or (b)(2) of this section, whichever applies.

[75 FR 10947, Mar. 9, 2010; 75 FR 17036, Apr. 5, 2010]

§ 431.447 Department of Energy recognition of nationally recognized certification programs.

(a) *Petition.* For a certification program to be classified by the Department of Energy as being nationally recognized in the United States (“nationally recognized”), the organization operating the program must submit a petition to the Department requesting such classification, in accordance with paragraph (c) of this section and § 431.448. The petition must demonstrate that the program meets the criteria in paragraph (b) of this section.

(b) *Evaluation criteria.* For a certification program to be classified by the Department as nationally recognized, it must meet the following criteria:

(1) It must have satisfactory standards and procedures for conducting and administering a certification system, including periodic follow up activities to assure that basic models of small electric motors continue to conform to the efficiency levels for which they were certified, and for granting a certificate of conformity.

(2) It must be independent of small electric motor manufacturers, importers, distributors, private labelers or vendors. It cannot be affiliated with, have financial ties with, be controlled by, or be under common control with any such entity.

(3) It must be qualified to operate a certification system in a highly competent manner.

(4) It must be expert in the content and application of the test procedures and methodologies in IEEE Std 112-2004 Test Methods A and B, IEEE Std 114-2010, CSA C390-10, and CSA C747 (incorporated by reference, see § 431.443) or

similar procedures and methodologies for determining the energy efficiency of small electric motors. It must have satisfactory criteria and procedures for the selection and sampling of electric motors tested for energy efficiency.

(c) *Petition format.* Each petition requesting classification as a nationally recognized certification program must contain a narrative statement as to why the program meets the criteria listed in paragraph (b) of this section, must be signed on behalf of the organization operating the program by an authorized representative, and must be accompanied by documentation that supports the narrative statement. The following provides additional guidance as to the specific criteria:

(1) *Standards and procedures.* A copy of the standards and procedures for operating a certification system and for granting a certificate of conformity should accompany the petition.

(2) *Independent status.* The petitioning organization should identify and describe any relationship, direct or indirect, that it or the certification program has with an electric motor manufacturer, importer, distributor, private labeler, vendor, trade association or other such entity, as well as any other relationship it believes might appear to create a conflict of interest for the certification program in operating a certification system for determining the compliance of small electric motors with the applicable energy efficiency standards. It should explain why it believes such relationship would not compromise its independence in operating a certification program.

(3) *Qualifications to operate a certification system.* Experience in operating a certification system should be discussed and substantiated by supporting documents. Of particular relevance would be documentary evidence that establishes experience in the application of guidelines contained in the ISO/IEC Guide 65, General requirements for bodies operating product certification systems, ISO/IEC Guide 27, Guidelines for corrective action to be taken by a certification body in the event of either misapplication of its mark of conformity to a product, or products

which bear the mark of the certification body being found to subject persons or property to risk, and ISO/IEC Guide 28, General rules for a model third-party certification system for products, as well as experience in overseeing compliance with the guidelines contained in the ISO/IEC Guide 25, General requirements for the competence of calibration and testing laboratories.

(4) *Expertise in small electric motor test procedures.* The petition should set forth the program's experience with the test procedures and methodologies in IEEE Std 112-2004 Test Methods A and B, IEEE Std 114-2010, CSA C390-10, and CSA C747- (incorporated by reference, see § 431.443) and with similar procedures and methodologies. This part of the petition should include items such as, but not limited to, a description of prior projects and qualifications of staff members. Of particular relevance would be documentary evidence that establishes experience in applying guidelines contained in the ISO/IEC Guide 25, General Requirements for the Competence of Calibration and Testing Laboratories to energy efficiency testing for electric motors.

(5) The ISO/IEC Guides referenced in paragraphs (c)(3) and (c)(4) of this section are not incorporated by reference, but are for information and guidance only. International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH- 1211 Geneva 20, Switzerland/International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland.

(d) *Disposition.* The Department will evaluate the petition in accordance with § 431.448, and will determine whether the applicant meets the criteria in paragraph (b) of this section for classification as a nationally recognized certification program.

[77 FR 26639, May 4, 2012]

§ 431.448 Procedures for recognition and withdrawal of recognition of certification programs.

(a) *Filing of petition.* Any petition submitted to the Department pursuant to § 431.447(a), shall be entitled "Petition for Recognition" ("Petition") and

must be submitted, in triplicate to the Assistant Secretary for Energy Efficiency and Renewable Energy, U.S. Department of Energy, Forrestal Building, 1000 Independence Avenue SW., Washington, DC 20585-0121. In accordance with the provisions set forth in 10 CFR 1004.11, any request for confidential treatment of any information contained in such a Petition or in supporting documentation must be accompanied by a copy of the Petition or supporting documentation from which the information claimed to be confidential has been deleted.

(b) *Public notice and solicitation of comments.* DOE shall publish in the FEDERAL REGISTER the Petition from which confidential information, as determined by DOE, has been deleted in accordance with 10 CFR 1004.11 and shall solicit comments, data and information on whether the Petition should be granted. The Department shall also make available for inspection and copying the Petition's supporting documentation from which confidential information, as determined by DOE, has been deleted in accordance with 10 CFR 1004.11. Any person submitting written comments to DOE with respect to a Petition shall also send a copy of such comments to the petitioner.

(c) *Responsive statement by the petitioner.* A petitioner may, within 10 working days of receipt of a copy of any comments submitted in accordance with paragraph (b) of this section, respond to such comments in a written statement submitted to the Assistant Secretary for Energy Efficiency and Renewable Energy. A petitioner may address more than one set of comments in a single responsive statement.

(d) *Public announcement of interim determination and solicitation of comments.* The Assistant Secretary for Energy Efficiency and Renewable Energy shall issue an interim determination on the Petition as soon as is practicable following receipt and review of the Petition and other applicable documents, including, but not limited to, comments and responses to comments. The petitioner shall be notified in writing of the interim determination. DOE shall also publish in the FEDERAL REGISTER the interim determination and

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shall solicit comments, data and information with respect to that interim determination. Written comments and responsive statements may be submitted as provided in paragraphs (b) and (c) of this section.

(e) *Public announcement of final determination.* The Assistant Secretary for Energy Efficiency and Renewable Energy shall, as soon as practicable, following receipt and review of comments and responsive statements on the interim determination publish in the FEDERAL REGISTER a notice of final determination on the Petition.

(f) *Additional information.* The Department may, at any time during the recognition process, request additional relevant information or conduct an investigation concerning the Petition. The Department's determination on a Petition may be based solely on the Petition and supporting documents, or may also be based on such additional information as the Department deems appropriate.

(g) *Withdrawal of recognition—(1) Withdrawal by the Department.* If the Department believes that a certification program that has been recognized under § 431.447 is failing to meet the criteria of paragraph (b) of the section under which it is recognized, the Department will so advise such entity and request that it take appropriate corrective action. The Department will give the entity an opportunity to respond. If after receiving such response, or no response, the Department believes satisfactory corrective action has not been made, the Department will withdraw its recognition from that entity.

(2) *Voluntary withdrawal.* A certification program may withdraw itself from recognition by the Department by advising the Department in writing of such withdrawal. It must also advise those that use it (for a certification organization, the manufacturers) of such withdrawal.

(3) *Notice of withdrawal of recognition.* The Department will publish in the FEDERAL REGISTER a notice of any withdrawal of recognition that occurs pursuant to this paragraph (g).

[77 FR 26639, May 4, 2012]

PART 433—ENERGY EFFICIENCY STANDARDS FOR NEW FEDERAL COMMERCIAL AND MULTI-FAMILY HIGH-RISE RESIDENTIAL BUILDINGS

Sec.

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AUTHORITY: 42 U.S.C. 6831–6832, 6834–6835; 42 U.S.C. 7101 *et seq.*

SOURCE: 71 FR 70281, Dec. 4, 2006, unless otherwise noted.

§ 433.1 Purpose and scope.

This part establishes an energy efficiency performance standard for the new Federal commercial and multi-family high-rise buildings, for which design for construction began on or after January 3, 2007, as required by section 305(a) of the Energy Conservation and Production Act, as amended (42 U.S.C. 6834(a)).

§ 433.2 Definitions.

For purposes of this part, the following terms, phrases and words are defined as follows:

ANSI means the American National Standards Institute.

ASHRAE means the American Society of Heating, Refrigerating and Air-Conditioning Engineers.

ASHRAE Baseline Building 2004 means a building that is otherwise identical to the proposed building but is designed to meet, but not exceed, the energy efficiency specifications in ANSI/ASHRAE/IESNA Standard 90.1–2004, Energy Standard for Buildings Except Low-Rise Residential Buildings, January 2004 (incorporated by reference, see § 433.3).

ASHRAE Baseline Building 2007 means a building that is otherwise identical to the proposed building but is designed to meet, but not exceed, the energy efficiency specifications in ANSI/ASHRAE/IESNA Standard 90.1–2007,